IRON & COAL

THE IRON AND COAL TRADES' REVIEW

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No. 4,832

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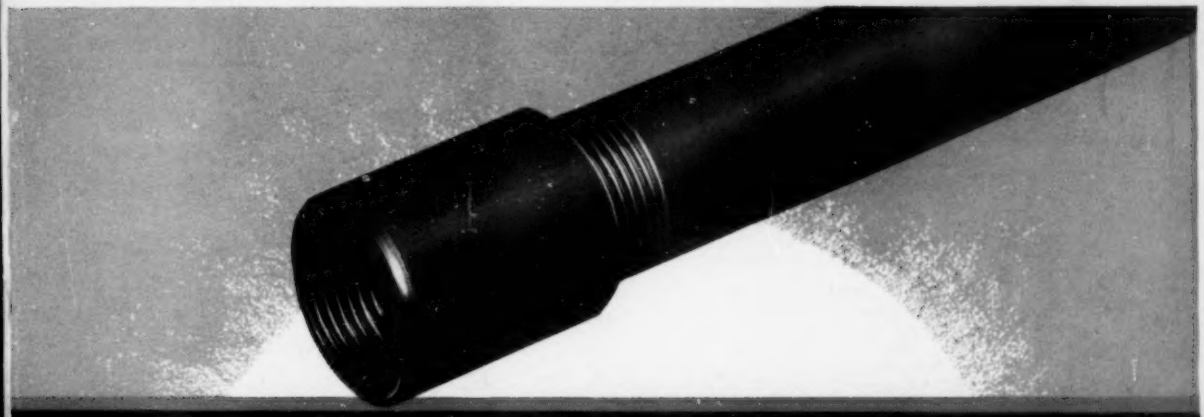

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stronger or cheaper than

steel tubes

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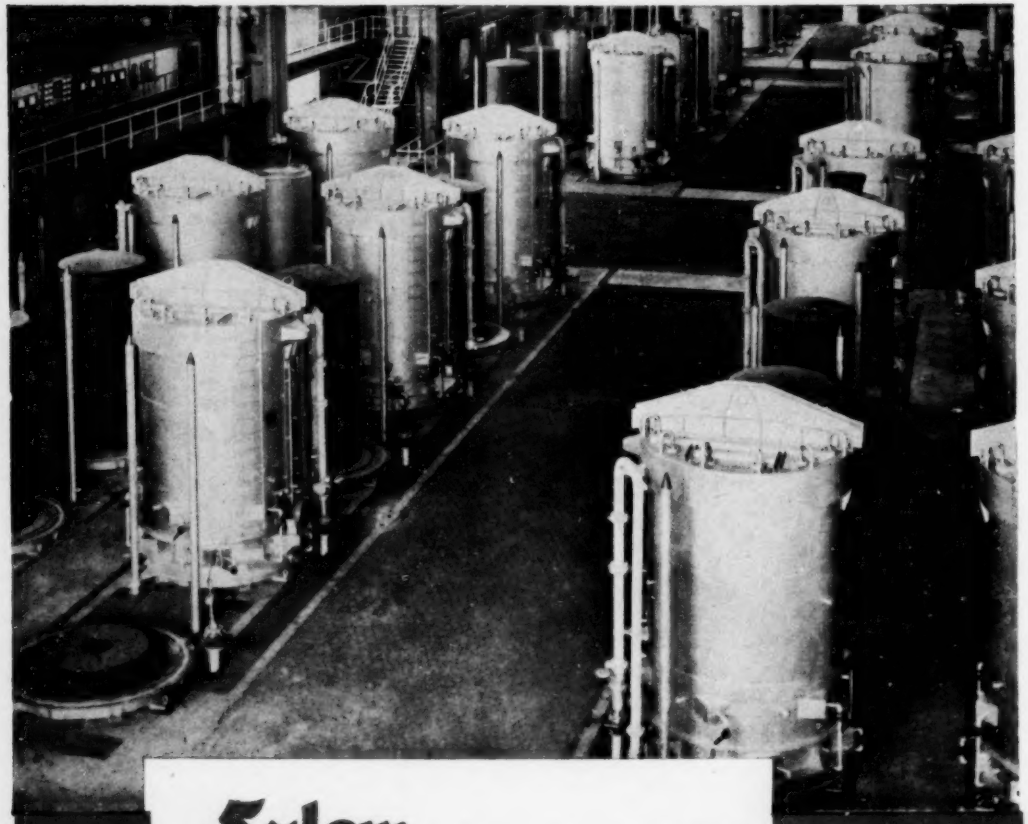

Salem for many years builders of modern multi-stack coil annealing plants now offer in collaboration with Messrs. Matthias Ludwig of Essen, the most up-to-date single stack coil annealing plants for both sheet and tin plate. More than 300 furnaces installed during the last 10 years.

Salem design, build and put into operation complete plant with all ancillaries.

Salem — BROSIUS

MATTHIAS LUDWIG ESSEN
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P.5072

At this plant near Kimberley, to produce one lb. of diamonds about 11,000 tons of blue clay have to be worked. Every day, with faultless regularity, thousands of tons of tailings must be carried away. They travel with certainty on M&C conveyors, which are kept efficient by the idlers. These idlers, used for belt conveyors the world over, spin at a touch. They go on keeping out dust, mud, and rain, because they are ***sealed for long life.***

← One of the many M&C conveyors taking the diamond tailings from a central plant to a thrower.

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MAXGRIP
TRANSMISSION BELTING

MORE GRIP

only MAXGRIP has the unique, specially designed driving ply which spells finis to belt slip: the cotton yarn from which this is woven is completely impregnated with Latex — thus the coefficient of friction is vastly improved and an unrivalled pulley grip is developed — MAXGRIP

1

2

MORE POWER

more grip means more power but MAXGRIP gives the highest horse-power bonus — 15% at all arcs of contact — or, if you prefer it the same power at reduced tension giving longer belt life — longer bearing life — longer fastener life.

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latex impregnation right through the yarns means that the driving ply will never lose its gripping power — as happens with conventional rubber and canvas belts. By combining this unique driving ply with a belt carcase of proved reliability, Angus have overcome one of the greatest problems associated with flat belt driving — the bogy of belt slip as the driving surface deteriorates. With MAXGRIP there is no more wasteful slipping — MAXGRIP means reduced maintenance time — more useful life.

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=15%

more power transmitted...

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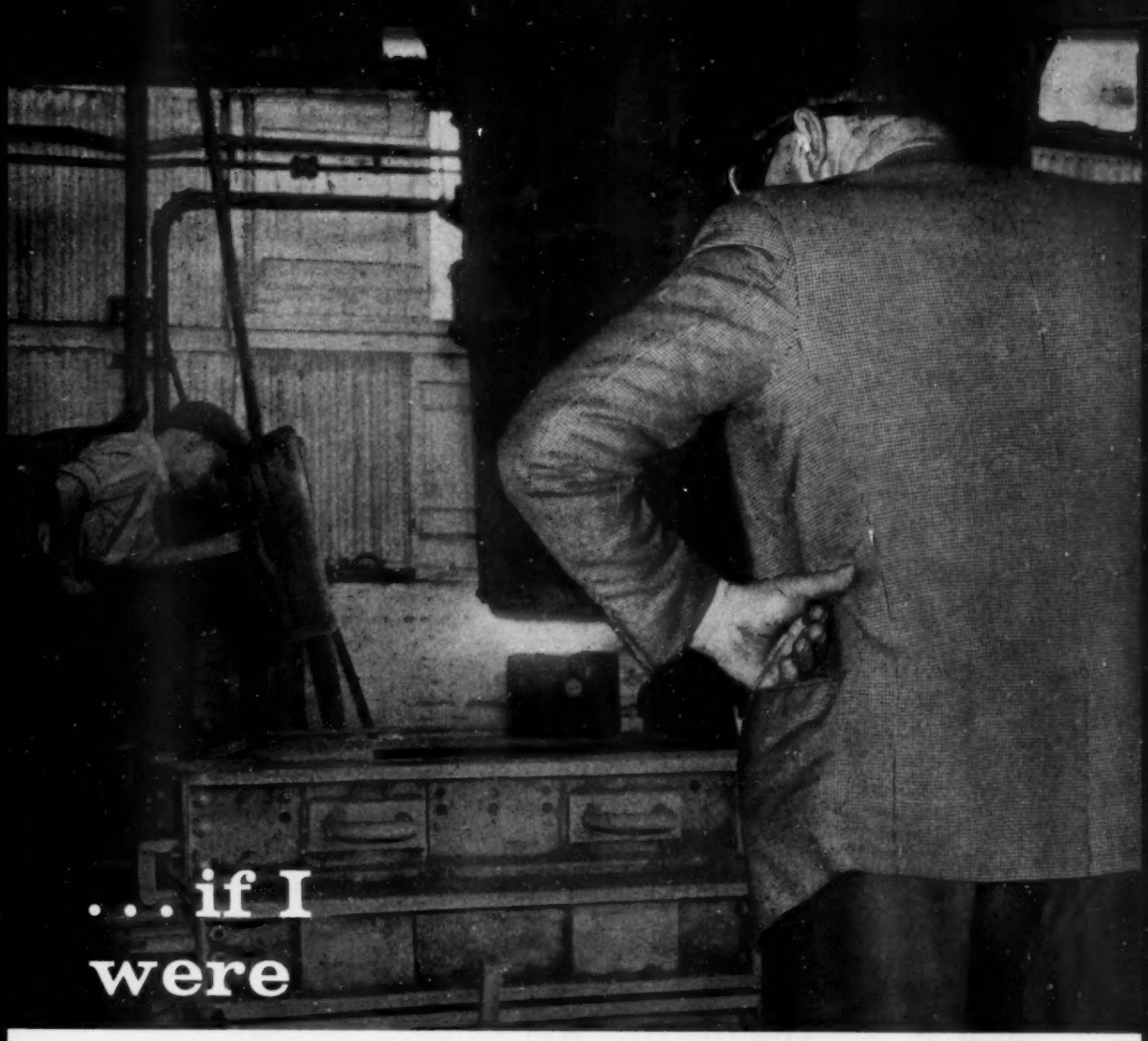
A43/60



. . . if I were

a Q.C.

". . .'Members of the Jury' I'd begin—and I reckon that would be my lot.

"You want a cool, calculating brain to tackle a job like that. Every step planned in advance—on your toes every minute of the day and heaven help the client if you make a mistake.

"A bit like casting a roll when you come to think of it—except for the talking. Always one move in front of the metal, every detail worked out to a hair-breadth and all the time Charlie, the crane driver, is sitting in his box like a blooming judge.

"As for the Jury? Well, I reckon all of us at AW fill that bill, but speeches won't sway us—it's the **result** that counts here."

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AW

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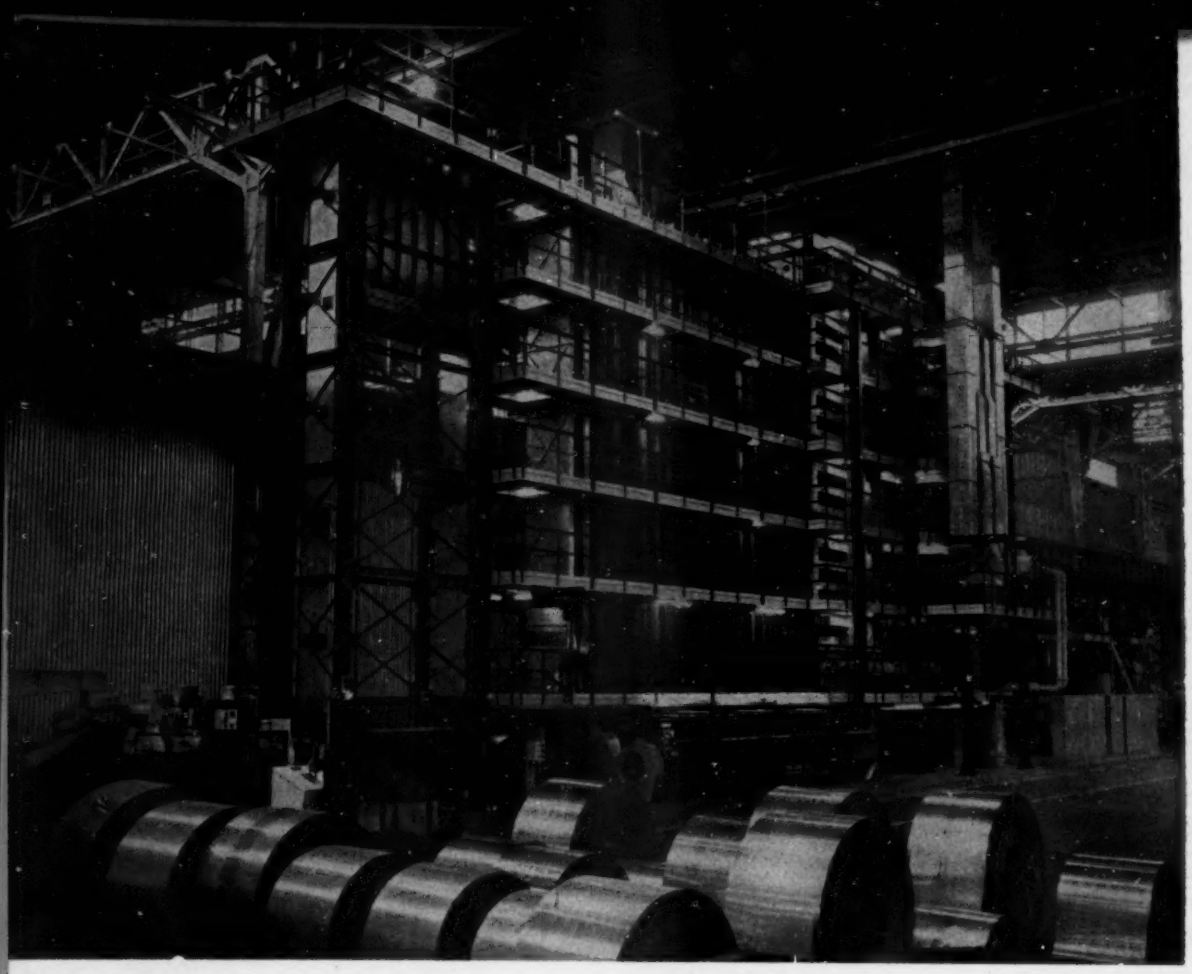

M.P. 25 Insulating Refractory Bricks

backed with

Fosalsil Economite Insulating Bricks

form the lining of the continuous vertical tinplate strip annealing line installed by The Incandescent Heat Co. Ltd. at the Velindre Works of The Steel Company of Wales Ltd. The normal operating speed of the plant is 600 ft. per minute, and the output is 2,500 tons per week, based on 30 inch wide strip ·011 gauge, although the maximum strip width is 38 inch.

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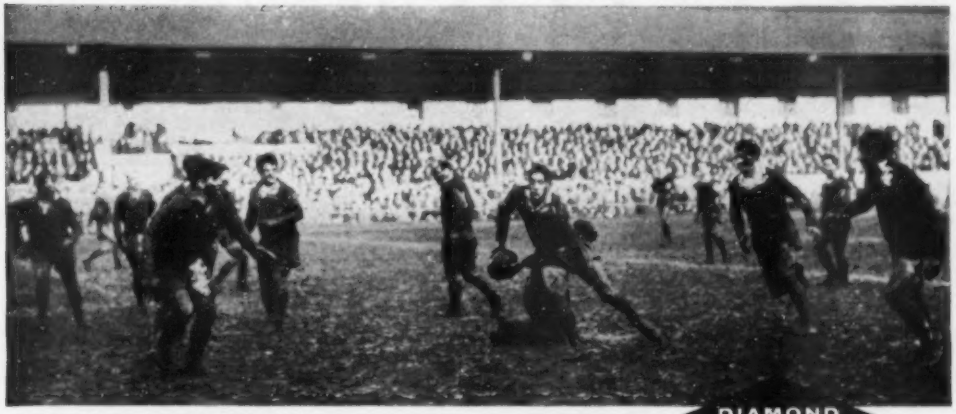
where wet conditions are a hazard



Photograph by courtesy of Hull Daily Mail

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Fenaplast COLLIERY CONVEYOR BELTING

is the answer!

Like international forward John Whiteley,
Fenner Diamond type belting is a top-class performer under all conditions.
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The all-round strength of this new range of colliery conveyor belting eliminates breakdowns in vital movements—
puts an end to the penalty of production losses.
It is proving a winner in all tests . . . especially where wet conditions are a hazard.

RANGE OF DIAMOND TYPE BELTINGS AVAILABLE					
N.C.B. APPROVAL NO.	150	158	149	158 HD	149 HD
TYPE	LIGHT DIAMOND	STANDARD DIAMOND	DOUBLE DIAMOND	HEAVY DIAMOND	EXTRA HEAVY DIAMOND
BREAKING LOAD MINIMUM PER INCH WIDTH	2000 LB	2000 LB	2500 LB	3000 LB	4000 LB
THICKNESS	7½ mm	8 mm	8 mm	8 mm	9 mm

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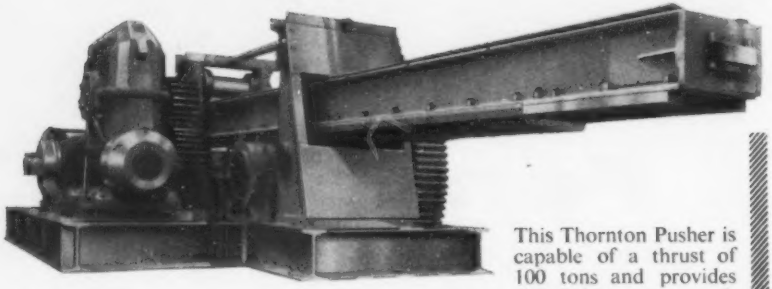
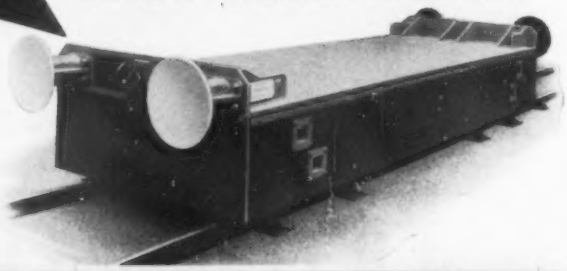
ANOTHER 100 TON FURNACE PUSHER...



This Thornton Pusher is capable of a thrust of 100 tons and provides the motive power to push a continuous train of ingot or slab furnace cars through the furnace.

60 TON CAPACITY CAR FOR SHOT BLASTING...



We designed this car with all-round rubber screening to provide added protection when bearing heavy castings for cleaning in a shot-blast chamber.

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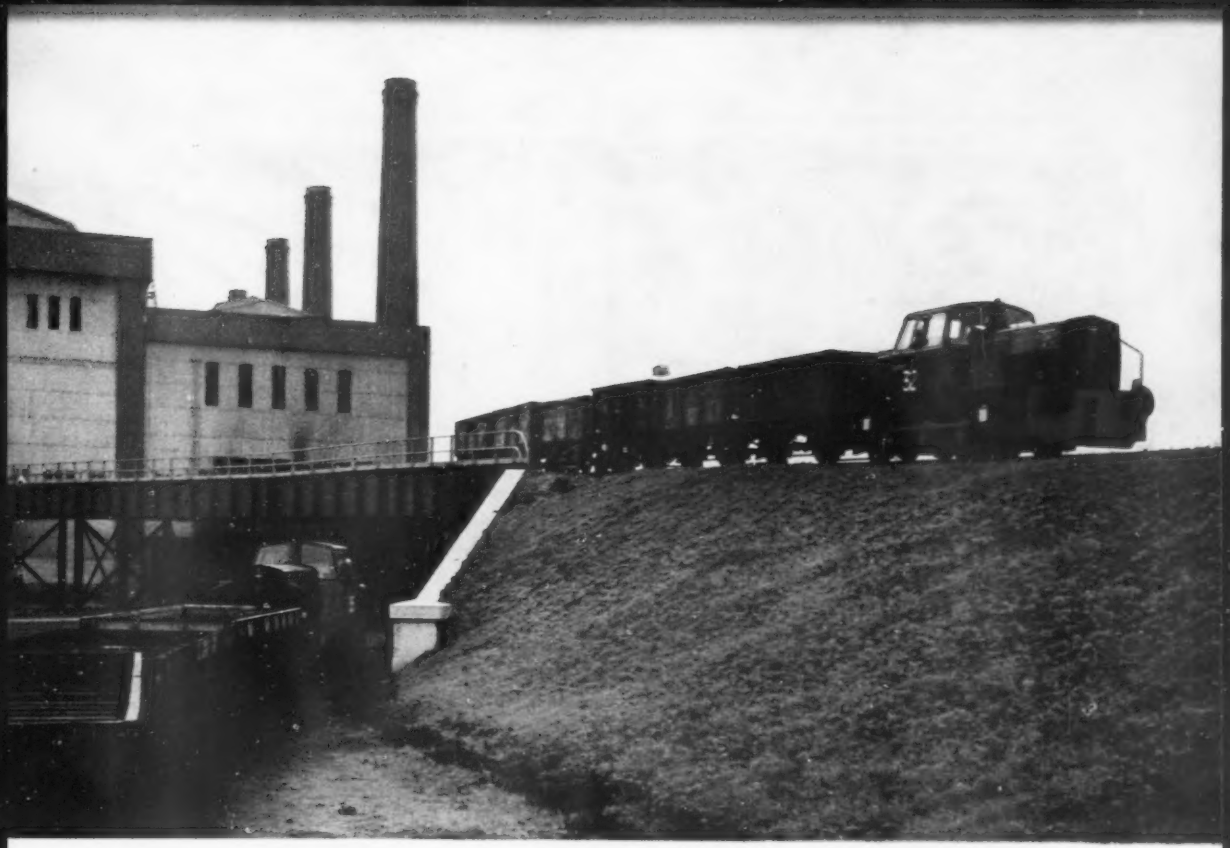

Performance

Visibility

Control...

Photographs by courtesy of Dorman Long (Steel) Ltd. Lackenby Works.

Sentinel 0-6-0 and 0-4-0 Industrial Locomotives are powered by Rolls Royce diesels with Rolls Royce Hydrokinetic Torque Convertors (Twin Disc license) giving continuously variable transmission ratio up to 5·2:1. Maximum tractive effort 0-6-0, 29,300 lbs, giving haulage capacity of 445 tons @ 10 m.p.h. on level & 176 tons @ 3 m.p.h. on 1 in 30 grade. Maximum tractive effort 0-4-0, 22,600 lbs, haulage capacity 378 tons @ 10 m.p.h. on level & 133 tons @ 3 m.p.h. on 1 in 30 grade. Brakes and control gear power operated, dual control. Completely unrestricted vision in all directions making for complete safety of operation.

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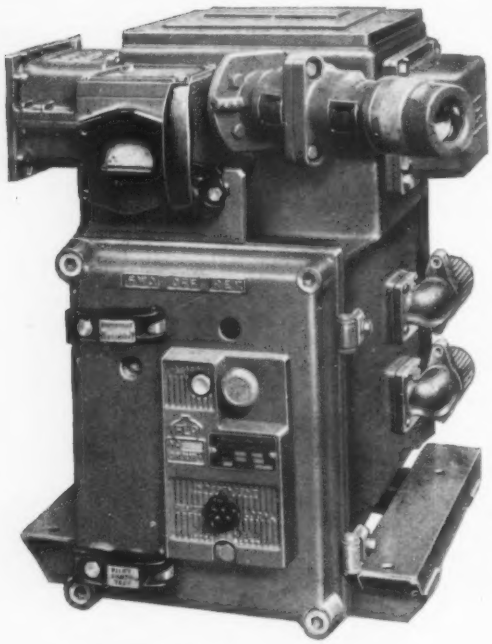
P.5120

1A

the Belmos SGU.30

30 ampere gate-end box

Designed in accordance with the NCB final draft specification the Belmos SGU.30 gate-end box provides features hitherto available only in the larger boxes



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2 **BUXTON-CERTIFIED for Group 1 gases – Certificate No. FLP 4318**

3 **Intrinsically safe EARTH LEAKAGE LOCKOUT circuit**

4 **Intrinsically safe remote control circuit complying with NCB SPECIFICATION P 130/1955**

5 **STALLED-CURRENT-BREAKING isolating switch**

6 **Remote control and sequence interlocking facilities**

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* *Fully described in leaflet F 311*

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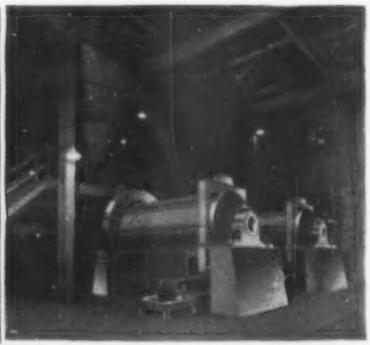

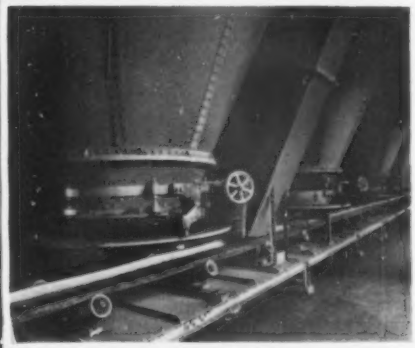

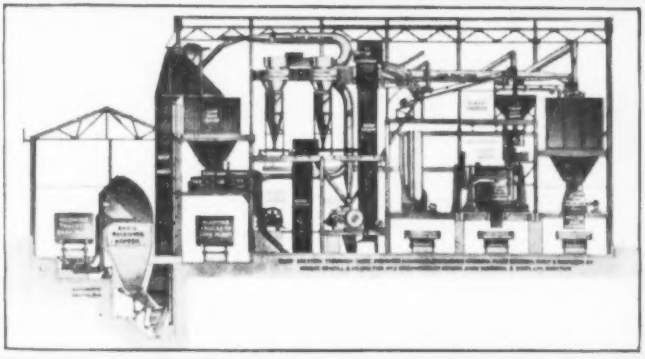

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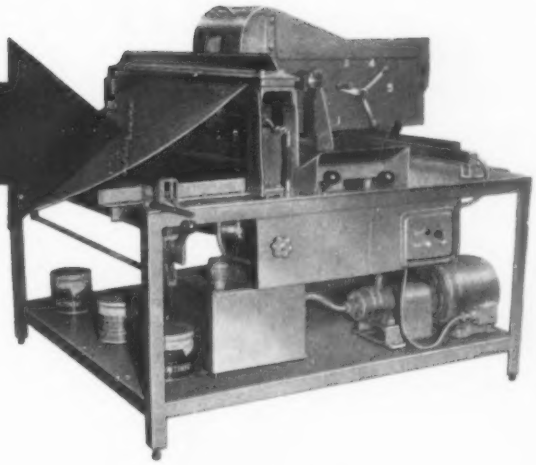
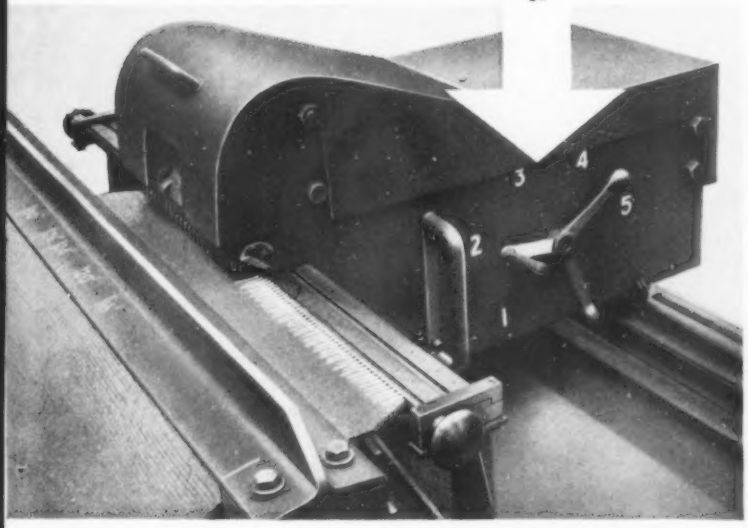
Hydraulic Belt lacing Equipment



FOR COLLIERY BELT WORKSHOPS



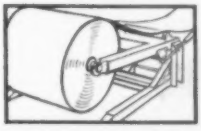
Ease, Speed and Simplicity of operation Belt-end is securely, mechanically held; ensuring perfect alignment of hooks. Hydraulically-operated jaws (adjustable to thickness of belting) ensure perfect clench. A 42" belt takes 5 minutes to joint.... calls for *no* effort!

Mechanically Perfect Joint As the hooks are always absolutely in line, and every hook correctly clenched, it is impossible to make anything *but* a perfect joint—which *must* last longer!

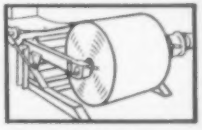
Wide Range 'Leviathan' is versatile. Takes any belt-width from 16" to 48". Any thickness of belt from $\frac{1}{4}$" to $\frac{3}{8}$". You can operate the 'Leviathan' a full working week without wasting a single hook!

Eliminates Operator Fatigue Leviathan provides *all* the power needed. The operator only controls it, and is still working as efficiently at the end of the day as during his peak period. Full utilization of machine, lower cost per joint *must* follow.

Complementary Equipment



UNCOILING HEAD
Hydraulically operated to lift coil clear of ground.



COILING HEAD
Electrically operated, re-coils belting after joint is made.

Every responsible colliery executive will naturally be interested in this latest development and is cordially invited to see it demonstrated at our factory.

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COLLIERY CONVEYOR BELT LACING SYSTEM

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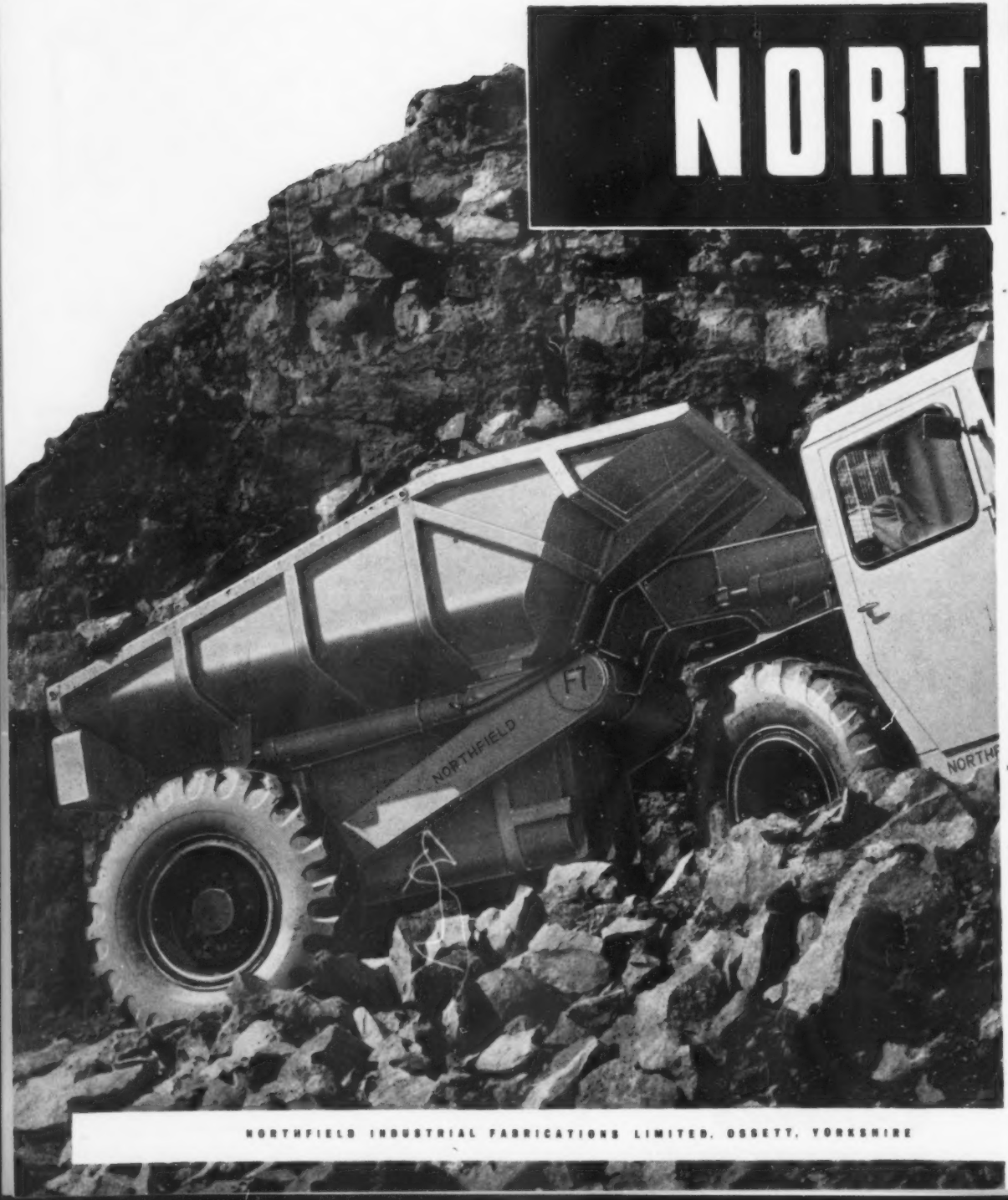

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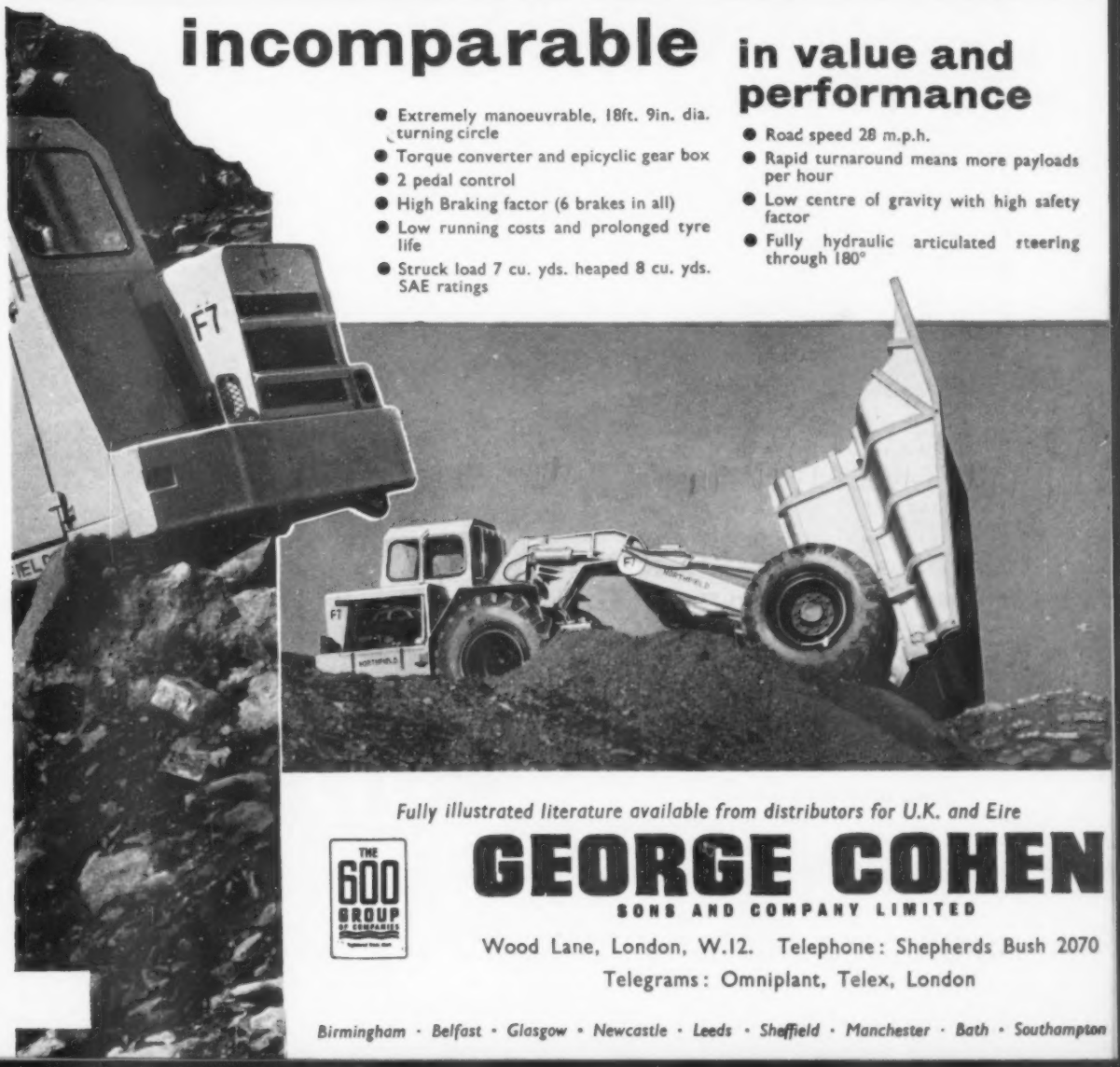

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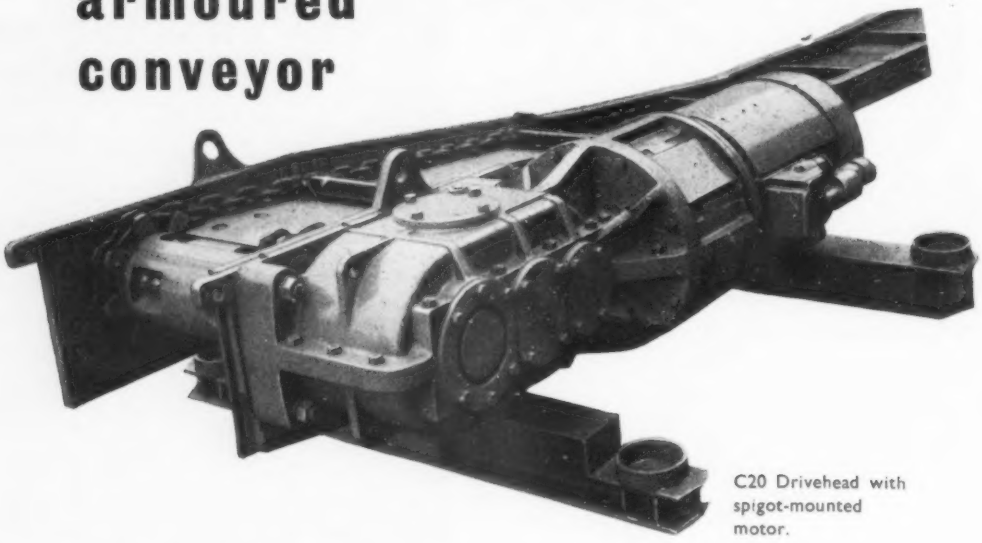
C20

armoured conveyor

Driveheads to NCB specification are now available



C20 Drivehead with spigot-mounted motor.

Now, C20 Driveheads are available to NCB specifications, as an alternative to the BJD design. Intermediate sections and chains are also to NCB specifications. Up to four BJD motors of either 50 hp or 60 hp give a total power of 240 hp, if required.

50 hp or 60 hp Motors available

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Specify Taylor Jumbo – It Pays

716

THESE THINGS DON'T HAPPEN

IF YOU KNOW THE ROPES

These photographs show some typical instances of damage to ropes and associated equipment caused by mishandling, wrong fitting or neglect. In each case serious damage was caused to the Wire Rope and considerable expense was involved in replacement and loss of output.

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Surface re-organisation

1 **Skip discharge equipment**
2 **Dirt disposal equipment**
3 **A washery conveyor**

Photographs by courtesy of the National Coal Board.

Sutcliffe service and equipment covers a wide range, including complete surface reorganisation schemes, washery conveyors, dirt disposal equipment and automatic skip discharge. Our unrivalled experience in surface conveying can be brought to bear effectively on *your* particular problem—send for our leaflet "Surface Handling", ref: IR/141 for full details.

Sutcliffe equipment takes good care of your coal

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RS. 141

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Easy to attach to bunkers or chutes, these vibrators
have no moving parts to lubricate, carry no maintenance problems.
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Rely on the experience of G.E.C.

372

and so a sinter plant is built

TODAY

The blast furnaces are consuming the full output of the sinter machine HH installed as part of the expansion programme at the Gartsherrie Works of Bairds & Scottish Steel Ltd.

TOMORROW

To cater for the future, the plant was designed so that a second sinter machine, although located away from the first strand, can receive raw materials from the same feed system.

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HH sinter plants are built to suit individual conditions so that every client obtains maximum benefit from progressive design. Precise control of the mix, the special forced draught cooler and a very adaptable stockyard arrangement are but three of the many specialities that make HH plants such economical producers of high quality sinter.

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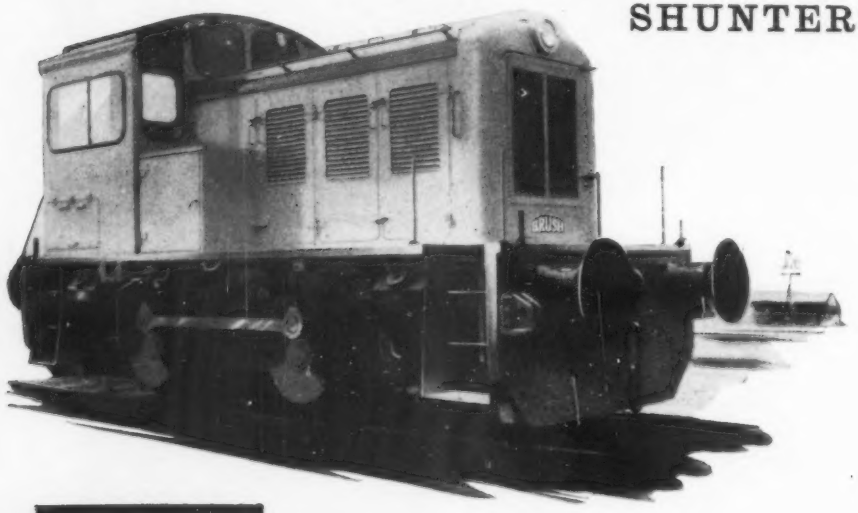
who have recently placed repeat orders for these reliable locomotives. Brush shunters can be specially built to meet any industrial requirements.

0-4-0 SHUNTERS



BRUSH TRACTION DIVISION

BRUSH ELECTRICAL ENGINEERING CO. LTD. LOUGHBOROUGH, ENGLAND *(Member of the Hawker Siddeley Group)*

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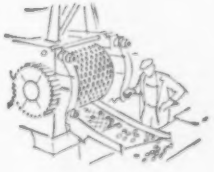

Briquetting enables fine pulverulent materials, metal bearing ores, ferrous and non-ferrous swarf to be used economically. It makes handling, transporting and stocking easier and, where the material is required for processing, it can improve production.
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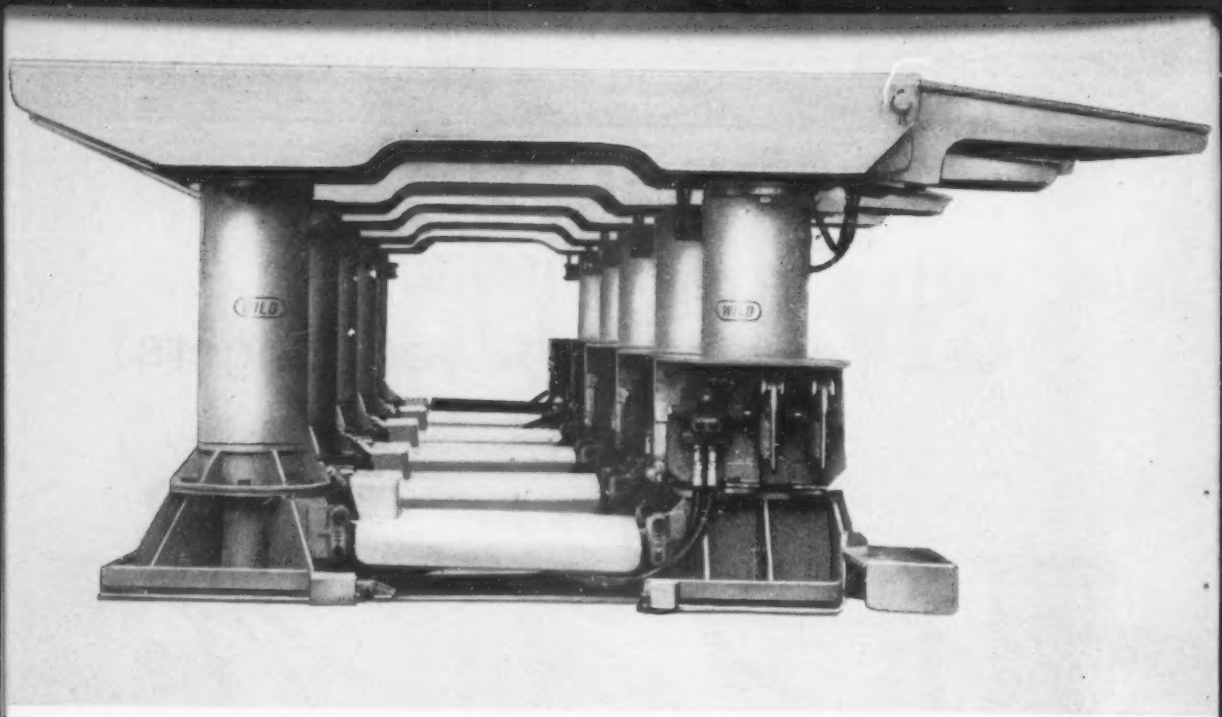
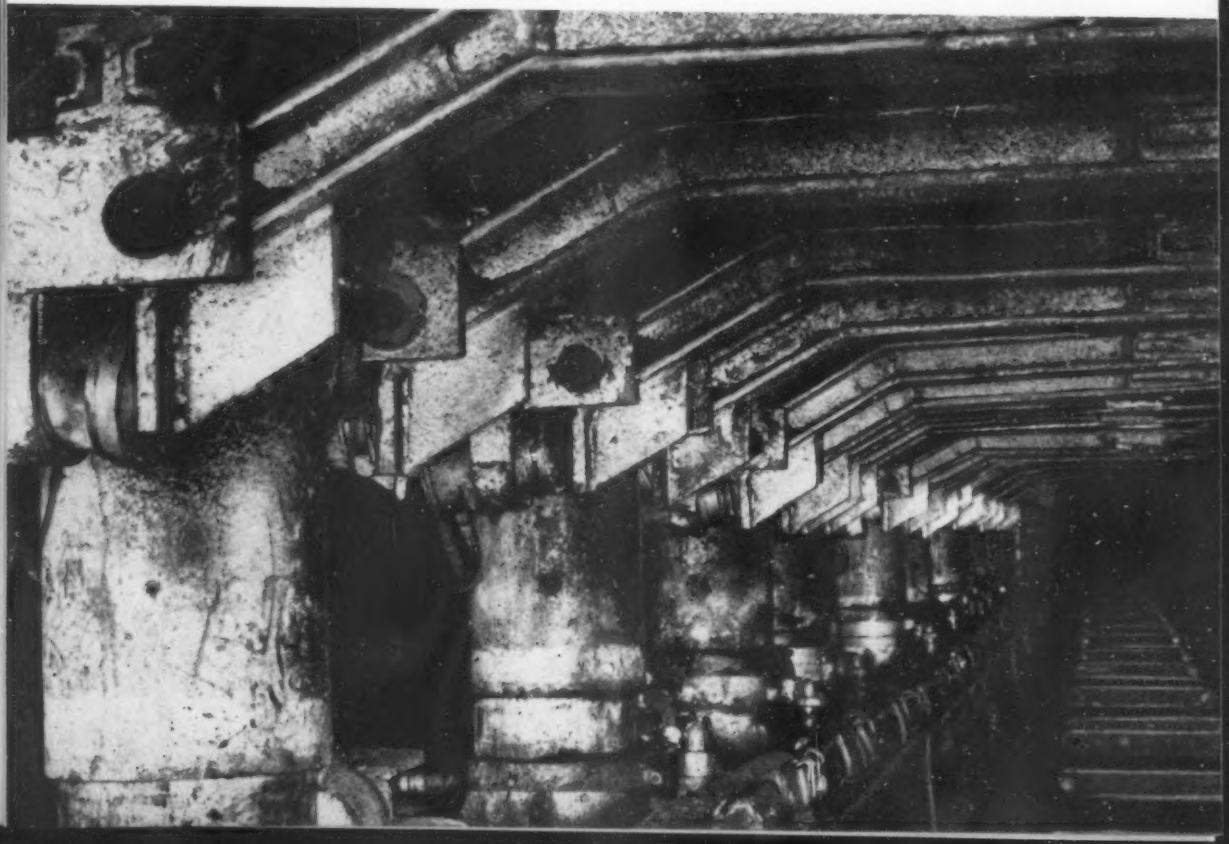


Above:

Goal Post type powered support system, before installation at the face. WILD double-acting rams actuate the units.

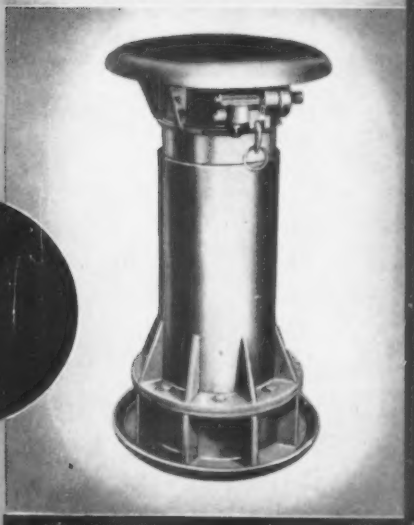
Below:

An installation of Gull Wing type powered supports.



SUPPORT SYSTEM

BY WILD



Top: 50 ton thin seam Desford Chock.
Centre: 100 ton Desford Chock with pedestal.
Bottom: 100 ton Desford Chock with ratchet extension and ram.

The Desford range of roof support is now widely used in the coal fields. This equipment is designed to withstand the rigorous conditions underground. It operates on water pressure from the high pressure main or pump and is extremely simple to control; yielding is entirely automatic. Due to simple and robust design maintenance is cut to the minimum and components can be easily exchanged at the coal face in a matter of minutes.

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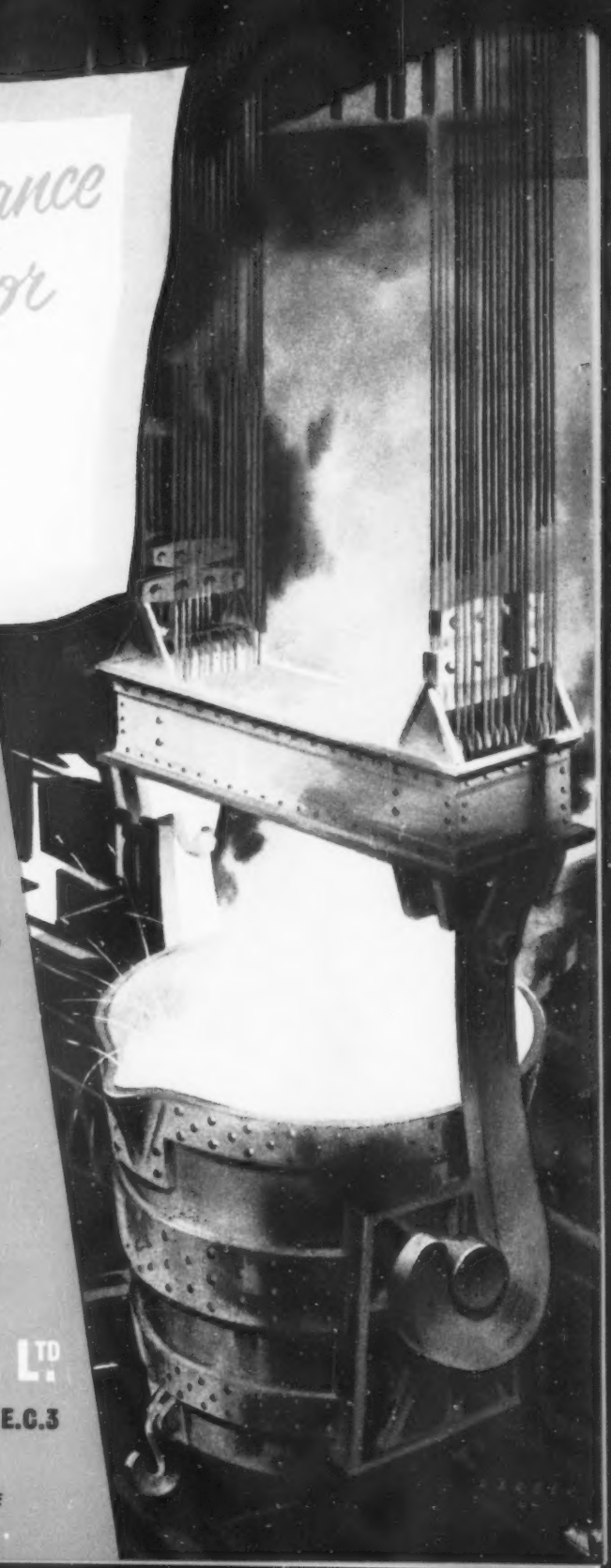

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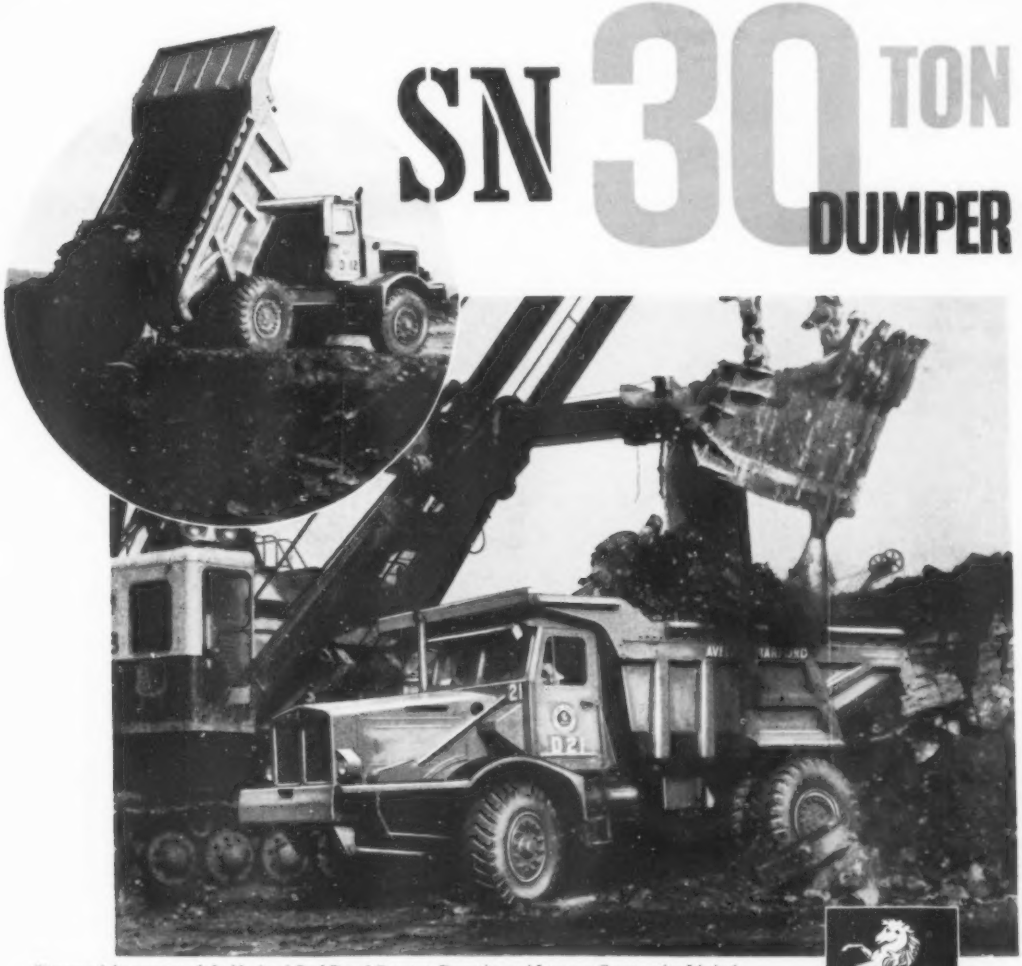

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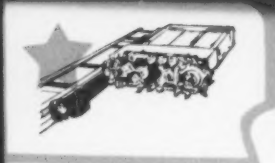

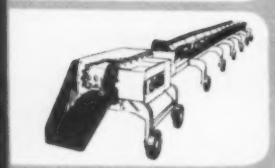

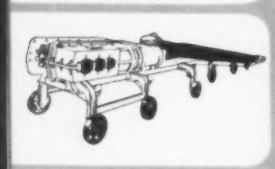

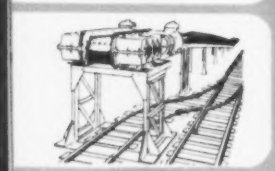

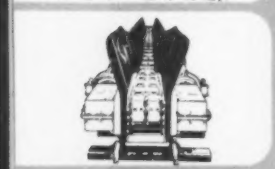

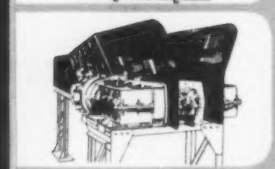

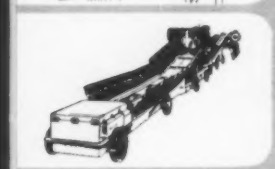

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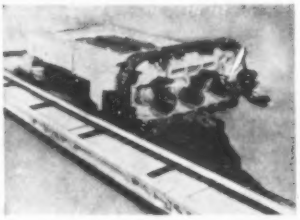
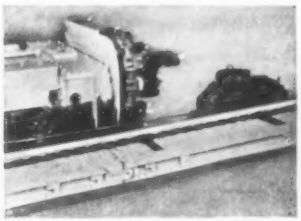


The machine as illustrated is single ended and has four boring arms spaced at approximately 72° lag to each other. These operate ahead of the periphery chain which clears any uncut and unloaded coal. The chain includes flight pick boxes specially designed to ensure complete loading of coal.



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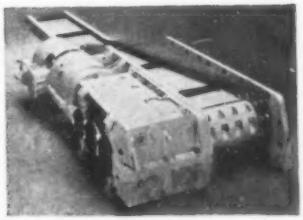
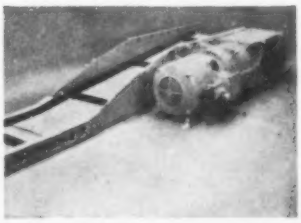
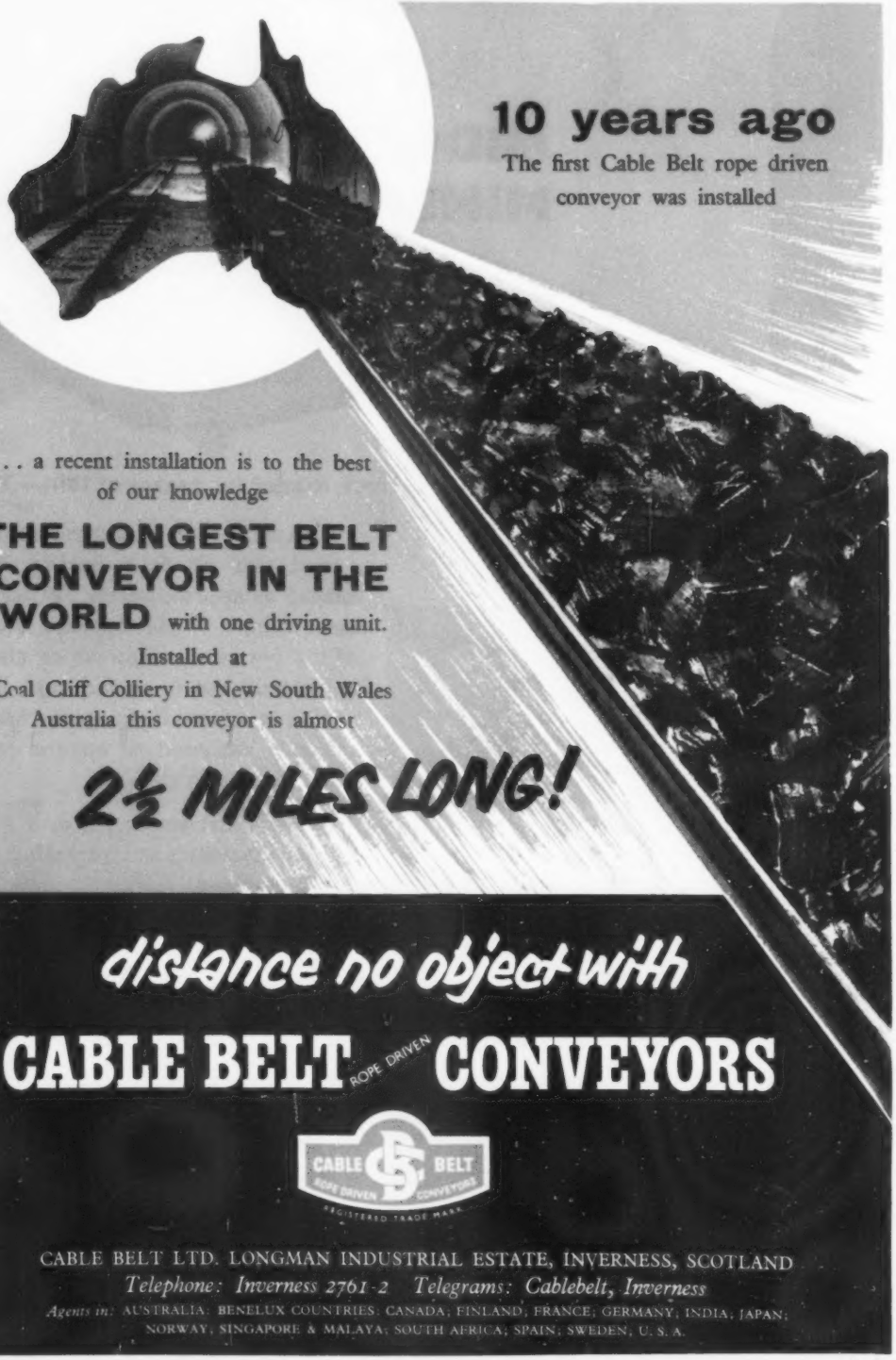


The illustrations on either side show the C5 Lo-hite conveyor currently in use with the Midget Miner





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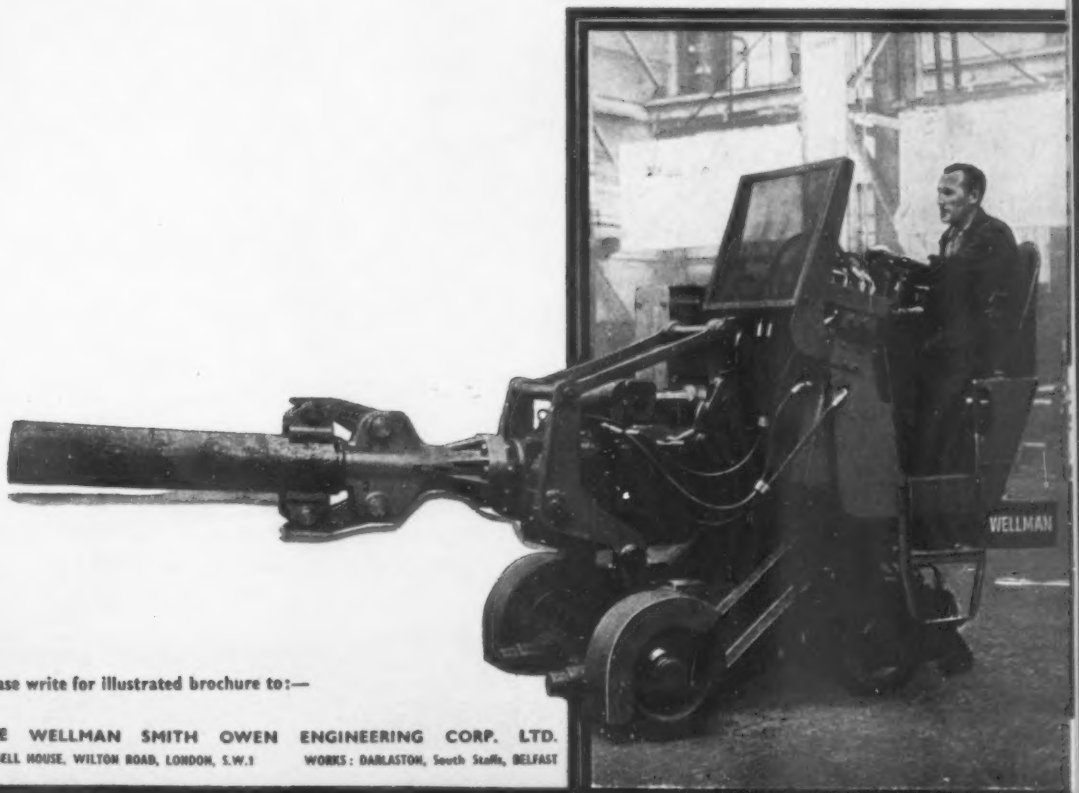

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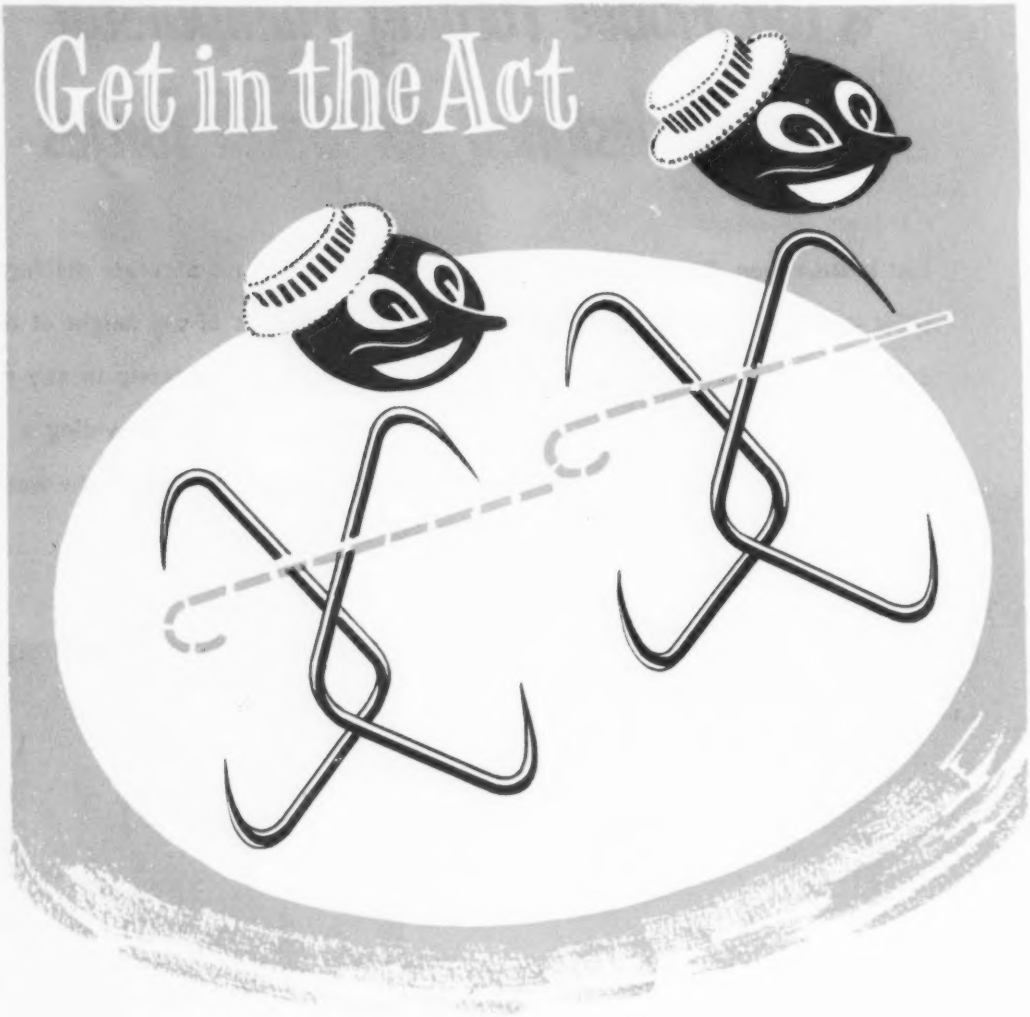

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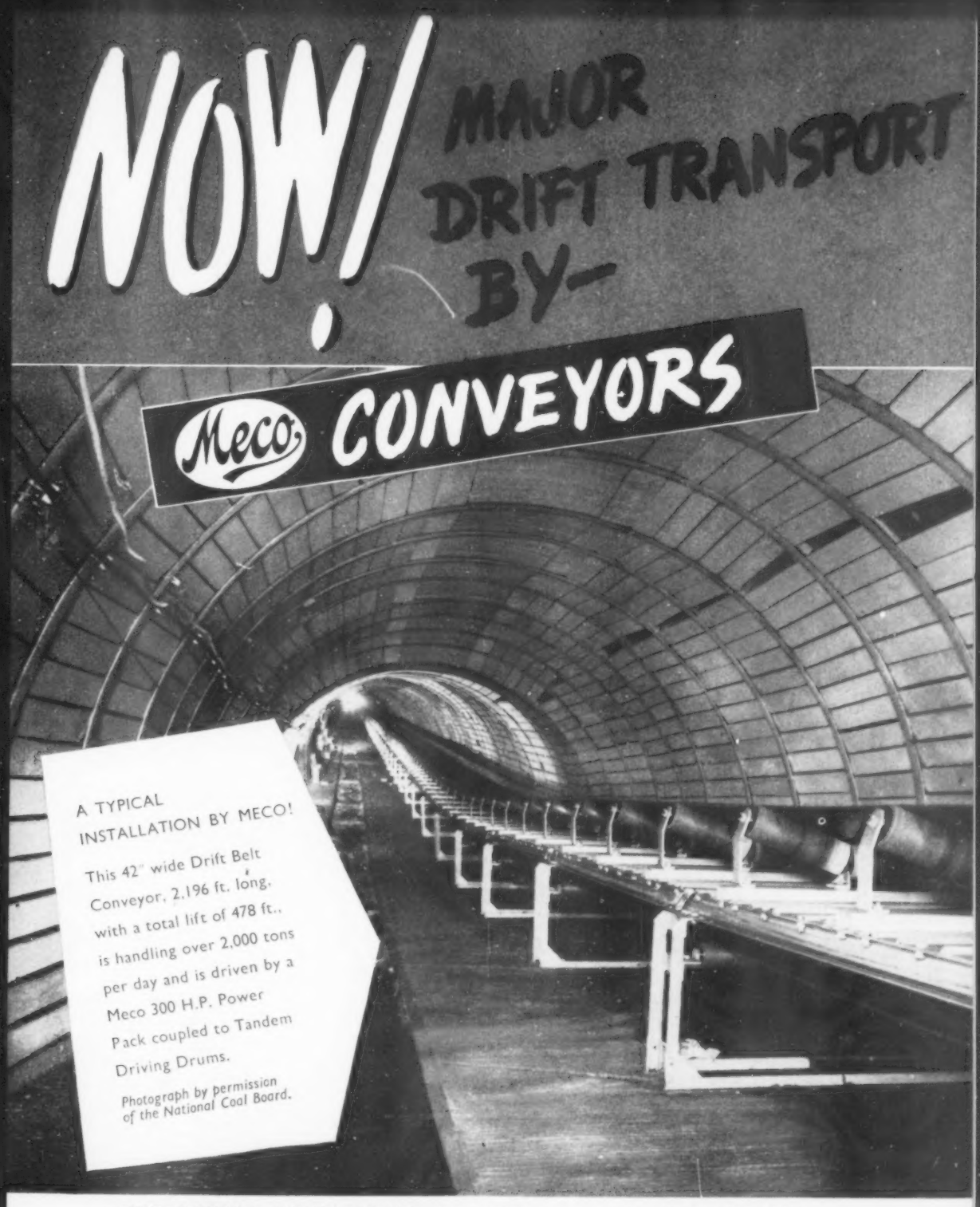
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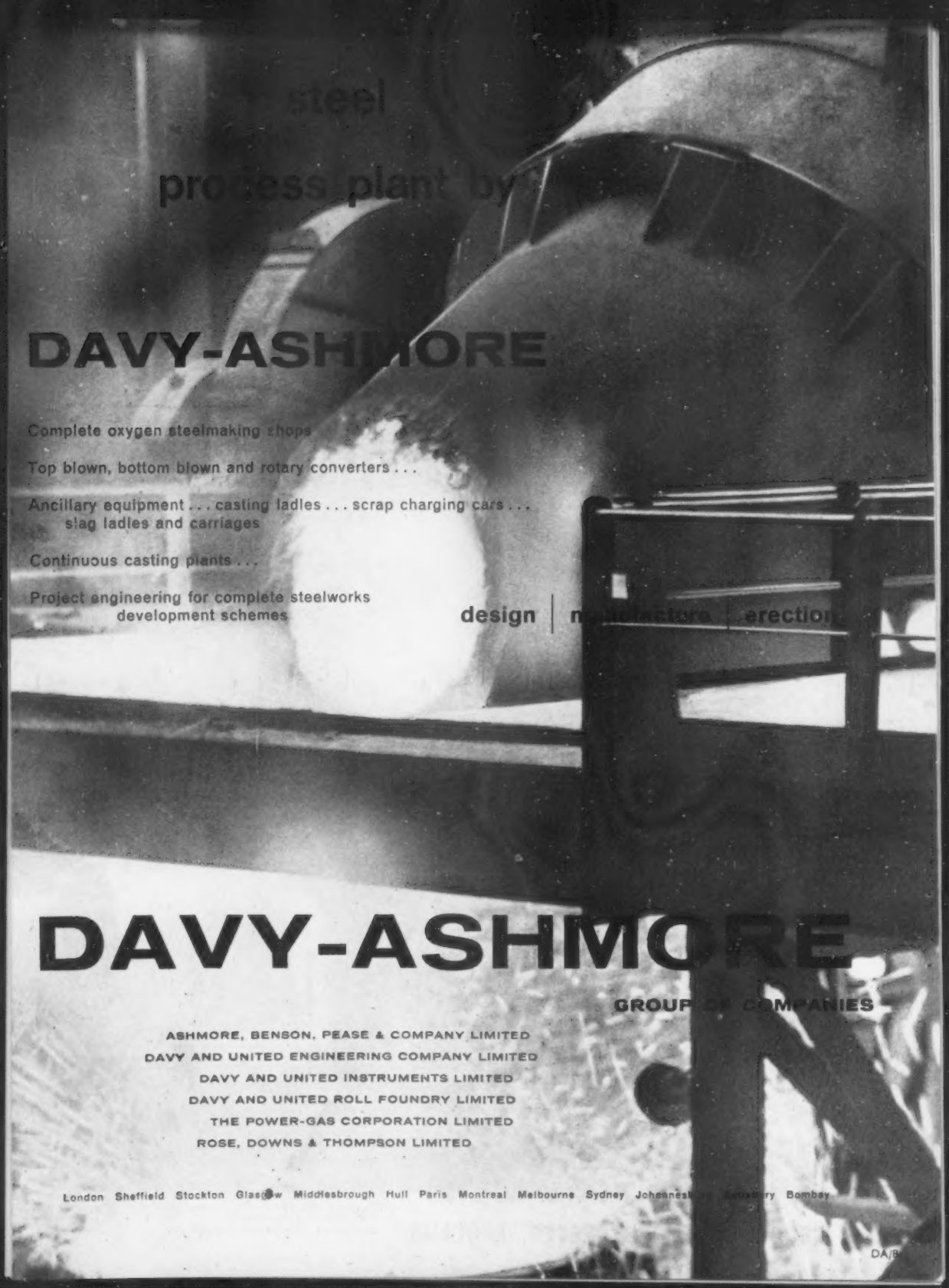
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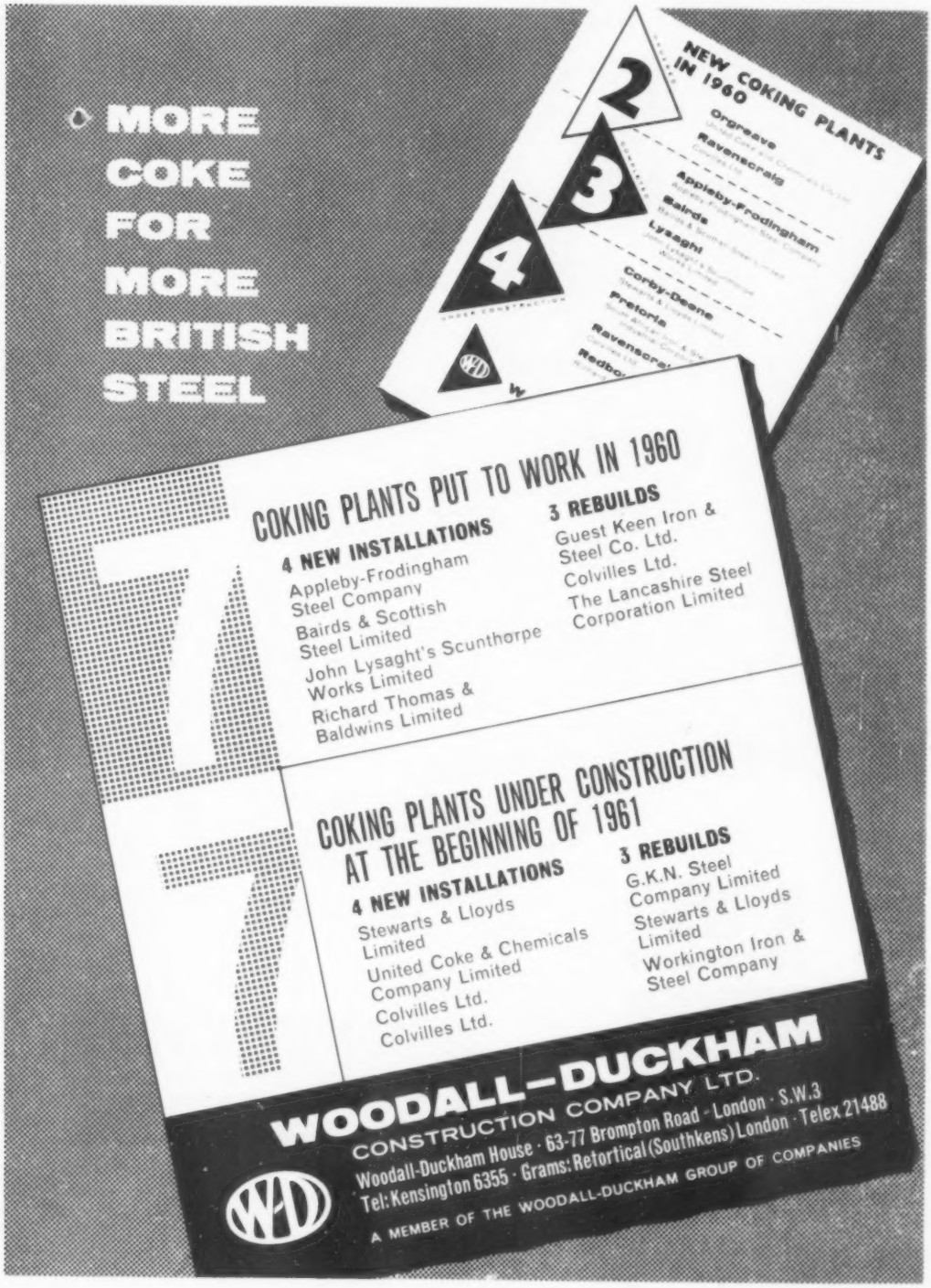
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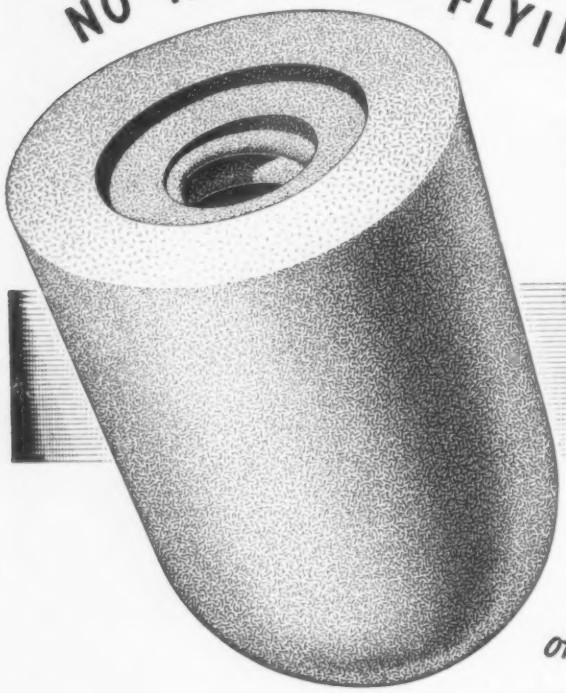

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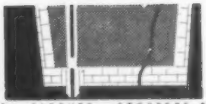

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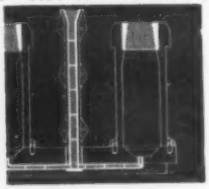

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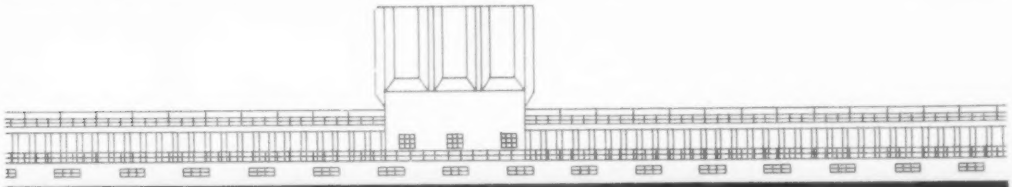

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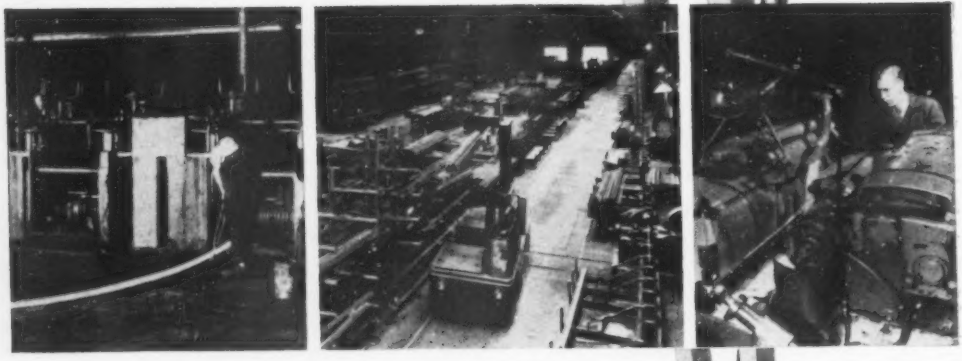

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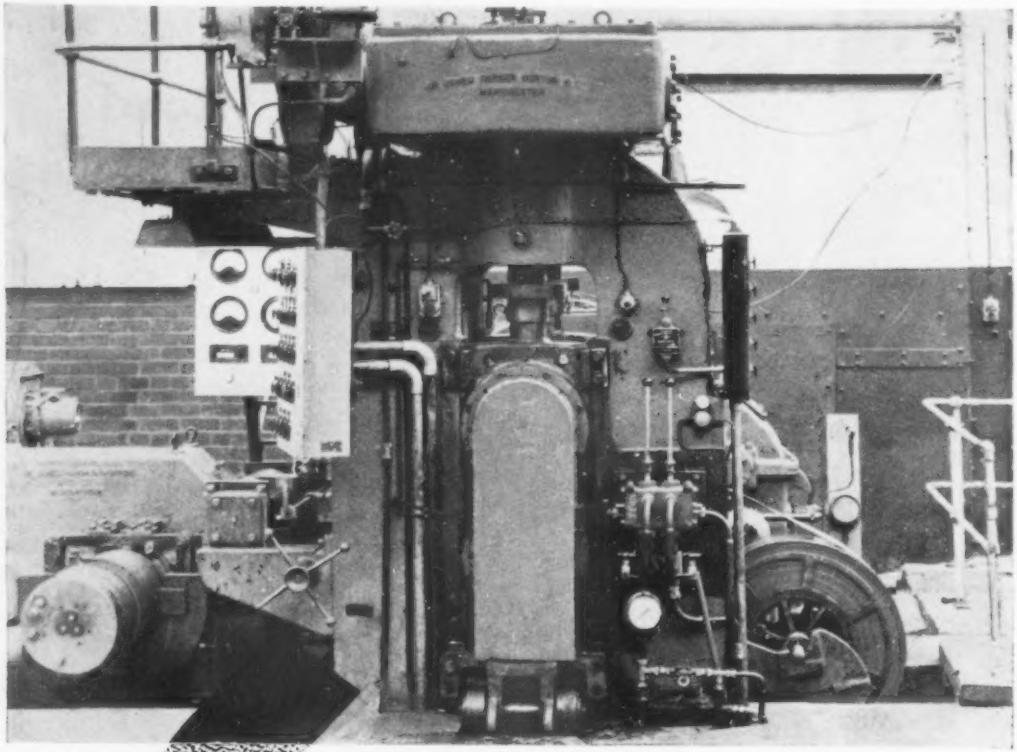

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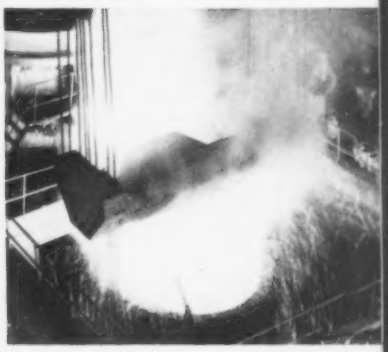

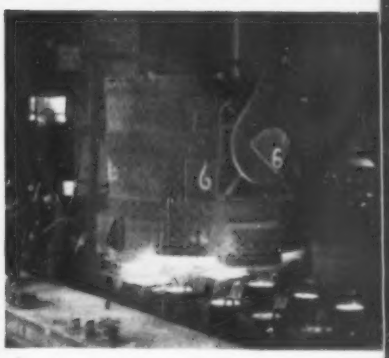

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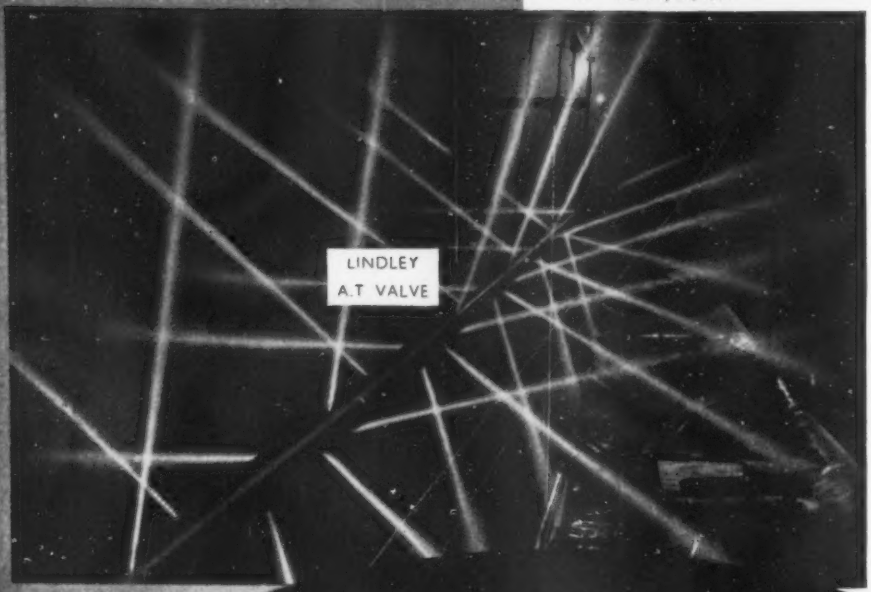

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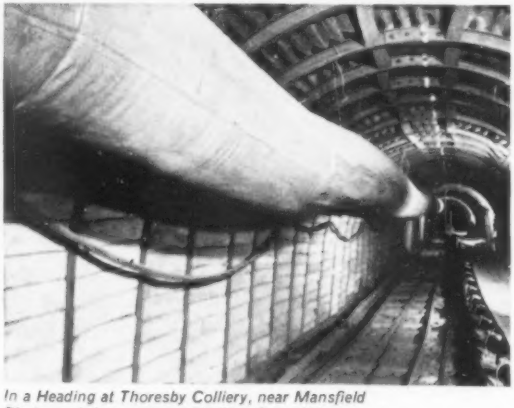

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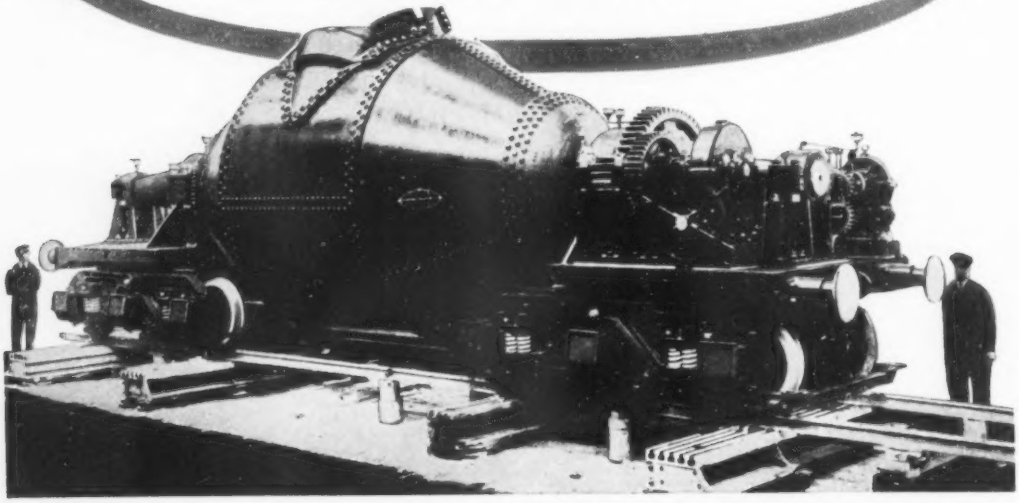

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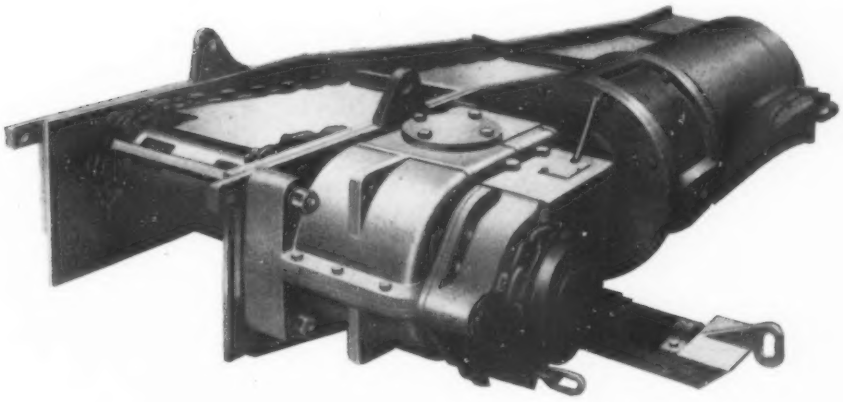

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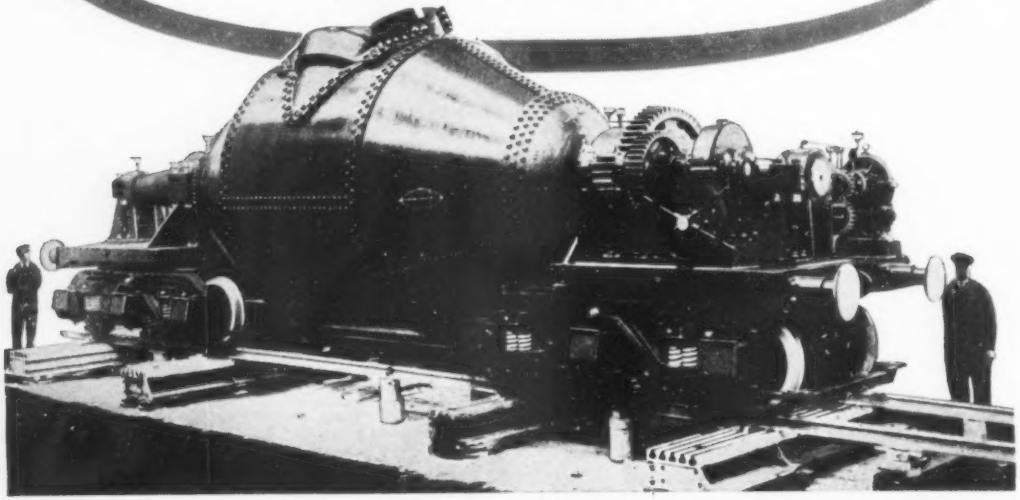

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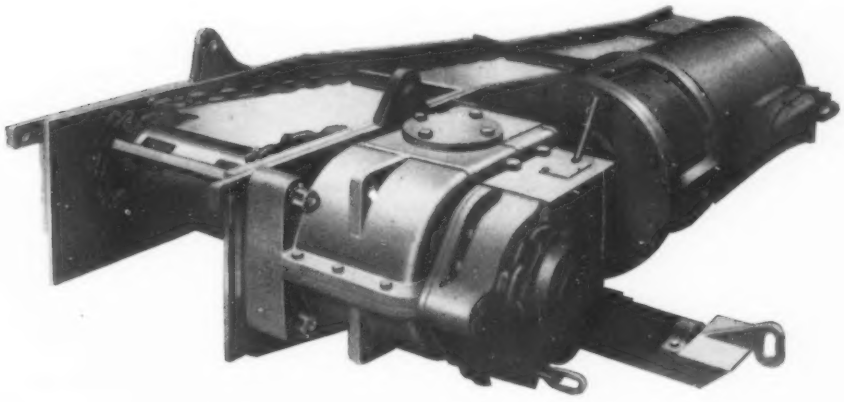

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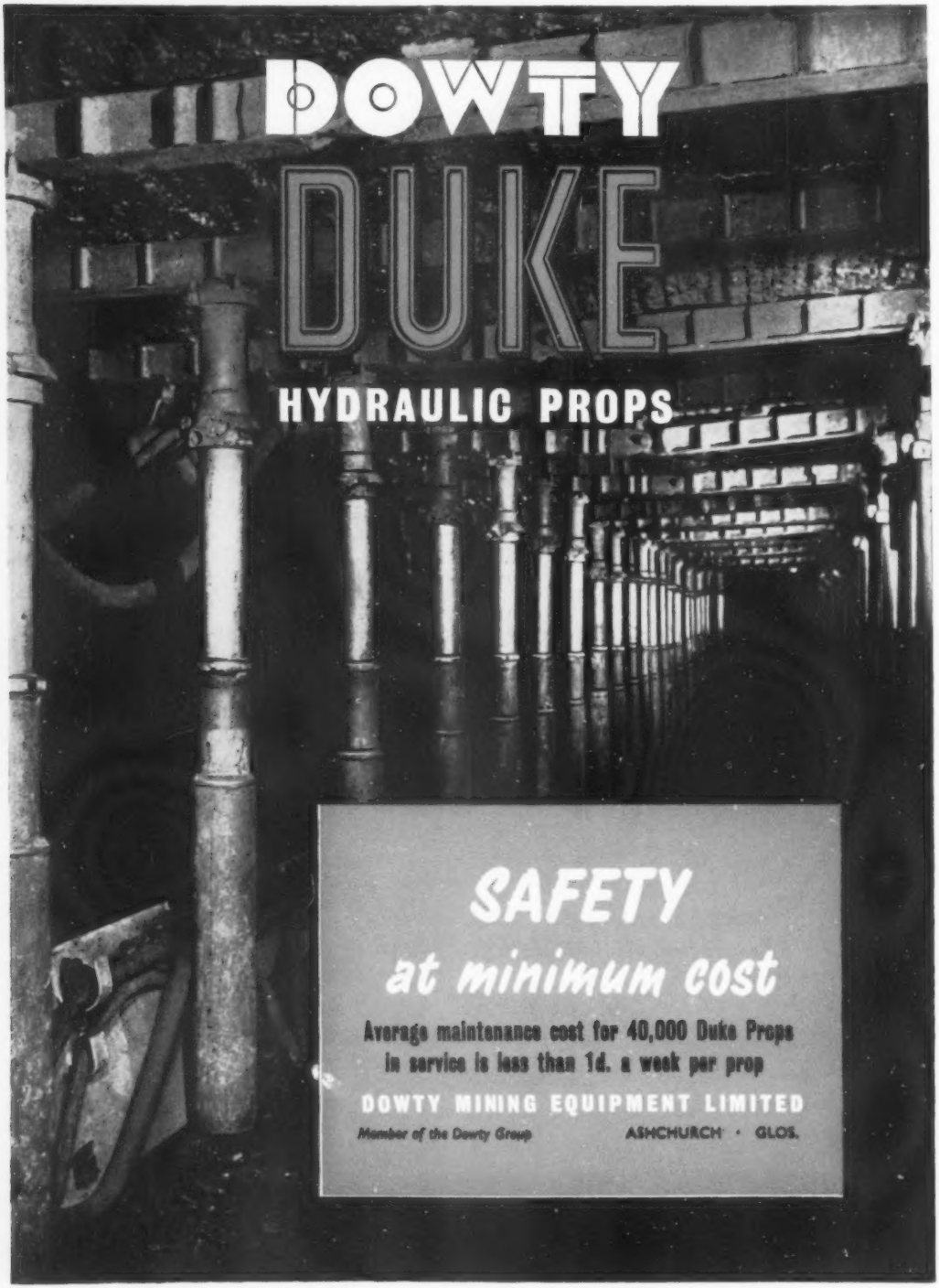
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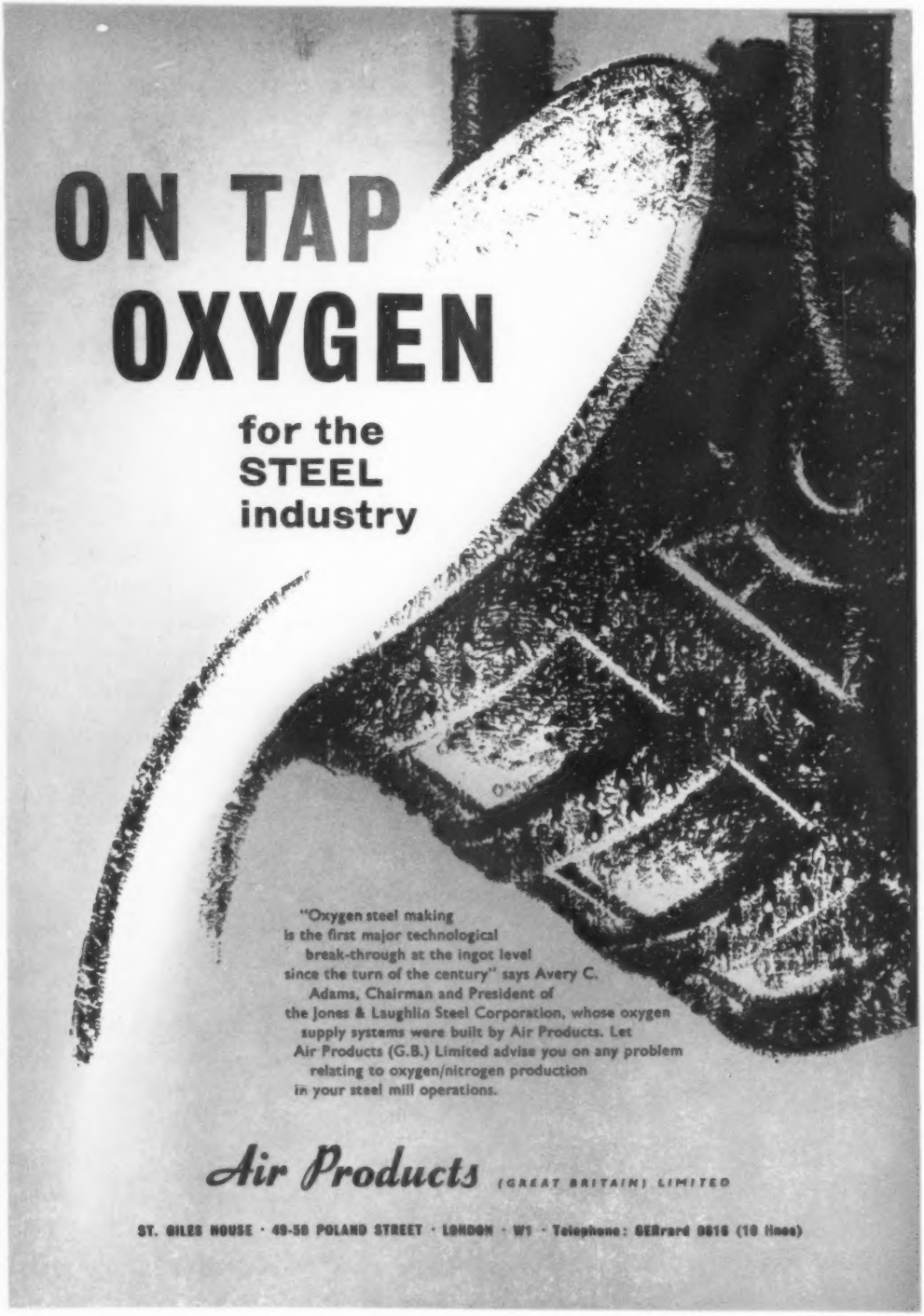

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Vol. 182
No. 4832

IRON & COAL

THE IRON AND COAL TRADES' REVIEW

FEBRUARY 24
1961

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In this Issue—

ELLIPTICAL INSETS
Construction at Wolstanton Colliery - - - - page 389

BISRA STEELMAKING CONFERENCE
Discussion of Two Papers - - - - - - page 397

AUTOMATIC GAUGE AND TENSION CONTROL
New System Devised at Ebbw Vale - - - - page 401

PNEUMATIC STOWING EQUIPMENT
Some Recent Developments - - - - - page 403

TWO CONTINENTAL STEELWORKS
New Features Reported - - - - - - - page 413

	PAGE
Leading Article: Explosion Hazard of Wet Coal Dust	379
Passing Thoughts	380
Yorkshire Pit to Close in 1964	380
Breakthrough in 1962	381
New Notts Power Station	381
Mine Deputies Face the Future With Confidence	381
Personal	382
AEI Makes Executive Changes at Rugby	382
Steel Shares Offer	383
Britain Helps Foreign Industrial Relations Officers	383
Appointments	384
Metallurgy Fellowships at Sheffield University	384
ECSC 1961 Coal Forecast	385
Durham Miners Win Invention Awards	385
Board Changes	386
£34,000,000 Orders Placed for New Power Station	386
Obituary	387
Memorial Service for Mr. H. W. Hembry	388
Forthcoming Events	396
Siemens Betatron for Head Wrightson	402
Telescopic Sprag	405
Cold Extrusion of Steel	406
Mill Housings for Aluminium Rolling Mill	406
Metallurgical Patents in the US	407
Associated Electrical Activities in 1960	410
Management in the Motor Industry	411
Consumption of Explosives in the US	411
The Leedsall Dumper	412
Mining Research at Nottingham University	412
"Open Days" at BISRA Sheffield Laboratories	414
Nitrous Fume from Blasting	414
New Literature	415
New Mine Winder Installations	416
US Coke Production Costs	416
Jibbing-in Spray Attachment	416
National Coal Board Specifications	416
New Chock for Thin Seams	417
Nylon in the Mining Industry	417
RTB's New Medical Centre at Ebbw Vale	418
In Parliament	419
Iron and Steel Trade	421
Ore Chartering	421
Coalfield News	422
Pithead Gear Installation Does Not Hinder Production	422
The Coal Trade	423
Coal Stocks Dwindling Rapidly	423
British Blast Furnaces in the December Quarter—1960	424
The Scrap Markets	424
Orders Placed	426
News in Brief	428
Law Cases	430
Company News	432
No Nationalization for Eire's Coal	434
Coroner's Advice to Miners' Relatives	434
Coal Chartering	434
"Don't Go in Pit, Son" Attitude Condemned by NUM	434

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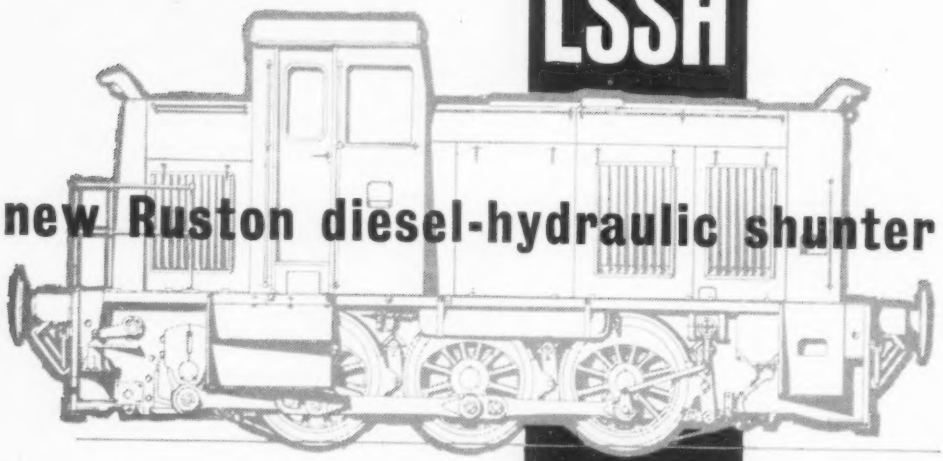

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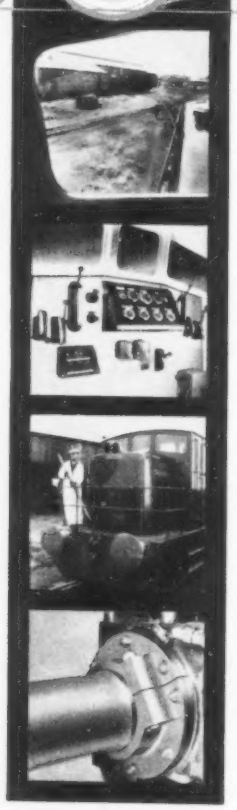

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IRON & COAL
THE IRON AND COAL TRADES REVIEW

Vol. 182 February 24, 1961 No. 4,832

Explosion Hazard of Wet Coal Dust

HAVING in mind certain of the circumstances attending the explosions at Kames and Lindsay collieries in Scotland, and also the reports of researches carried out at the Polish Research Station for Mining Safety by Dr. W. B. Cybulski, the Sub-committee on Mining Explosions, under the chairmanship of Sir Andrew Bryan, which considered ways and means of reducing the explosion hazard in mines, thought that the question of protection against the propagation of an explosion by mine dust in wet conditions should be looked at afresh. Accordingly, in its report dated February, 1959, it recommended to the Safety and Health Committee of the Coal Industry National Consultative Council that "a Working Party of experts in coal dust explosions should be established to consider all the available evidence, including the results of both British and Polish research and to submit a report, with recommendations, on their investigations."

This Working Party of experts was duly set up in November, 1959. Extracts from its excellent report on "Coal Dust Explosions" were given in our February 10 issue (p. 299). The report shows that the experts have fully carried out their remit and have put the explosion risk of wet dust in proper perspective and a glance at the contents page of the report indicates that they have tackled their subject in a businesslike way. They have also expressed their views in a manner that will heartily commend itself to colliery managers. The report, a model of its kind, is well-drawn and is written in terms that are both clear and convincing.

Most practising colliery managers are apt to worry—perhaps unnecessarily—when they hear that "experts" are handling a practical problem. They have a suspicion that many of the so-called mining experts live their lives so far away from the hurly-burly of day-to-day pit work that any suggestions they may make about the solution of a practical problem cannot but be impracticable. That the type of expert who knows more and more about less and less and is not a practical pitman can sometimes be a menace, there is no doubt. Such people are usually experts only in the finer and highly minute but often delusive accuracies of their subject; they are rarely experts in knowing if their suggestions are possible of application in practice.

So far as the report and recommendations of this particular working party are concerned, colliery managers need have no fear on the score of practicability. Indeed, the very fact that the party was under the chairmanship of Dr. H. L. Willett, was sufficient guarantee that the deliberations of the experts could not fail to result in a blend of science and practice that would prove acceptable to colliery managers who, after all, have often the thankless job of applying approved recommendations.

The report discusses at length two related problems: the Polish researches into the explosion hazard of fully-wetted coal dust (referred to as coal-dust mud) and their implications in British practice, and the explosion hazard arising from the deposition and accumulation of coal dust, not fully wetted, in damp and wet conditions. While the experts consider that both of these hazards are real, they make it quite clear that, in their opinion, the principal coal-dust explosion hazard remains in dry and dusty conditions; and they consider that this hazard demands further study.

Although much research relating to this hazard has been prosecuted during the past two decades, no general review of the position has been made since the "Special Report on Coal Dust Explosions" was prepared and published by the former Safety in Mines Research Board in 1943. The present Safety in Mines Research Establishment, having expressed a willingness to review the 1943 report in the light of subsequent experience and research, the experts recommend that this offer should be accepted and that the new report, when ready, should be considered by them or some other suitable expert body appointed by the industry.

Because of lack of suitable experimental facilities, the Working Party was unable to carry out confirmatory tests with the British coal dusts on the lines of the Polish research, but it made a close study of that research and endeavoured to provide a link between it and the practical application of its results. Its study of the work and also of recent experience in this country enabled the party to reach some interesting conclusions. Perhaps the most important is that although water on a mine roadway may be expected to add to safety by impeding dust dispersion, as well as by its suppressive effect on the propagation of flame, nevertheless—contrary to a commonly-accepted view in this country that wet coal dust would not be dispersed during an explosion and would not therefore propagate an explosion—there remains in wet or damp roadways a dust explosion hazard that must be dealt with.

The experts consider that the general risk of a

"muddy dust" propagating an explosion in the circumstances in which explosions are likely to occur in this country is not great. In their view "the ignition of a large body of explosive mixture of gas in certain circumstances, *e.g.*, in a long coal heading, might produce sufficient violence to raise thoroughly wet coal dust, but within our knowledge all the conditions conducive to such an explosion have not in the past arisen together in practice." A more serious risk under British conditions arises from patches of incompletely wetted but highly combustible dust, or from a superficial and readily dispersable covering of such coal-rich dust on apparently wet surfaces, which is capable of being raised into a cloud by a mild initiating explosion.

The experts advise that any deposit of dust or sludge should be regarded as potentially capable of being raised into the air by an explosion. They conclude that, whatever the proportion of water present, the addition of water alone to coal dust cannot ensure safety under all conditions. A level of safety comparable with that attained in dry conditions can, however, be achieved if the total incombustible content (including water) of the deposit is not less than that required in dry conditions; but this, in general, requires a spreading of stone dust.

Accordingly, the report suggests measures aimed at ensuring that the protection obtained against the explosion risk under wet conditions is comparable with that attained under mining conditions generally, and it recommends: (i) the spreading of an effectively waterproofed stone dust where conditions are wet or damp; (ii) the sampling of road dusts to include the sampling of appropriate lengths of road where the conditions are wet or damp; and (iii) the installation of waterproofed stone-dust barriers, in conjunction with general stone dusting in wet conditions, wherever they would have been required had the roads been dry.

There can be little doubt that the implementation of these recommendations would mark an important advance towards greater safety by reducing the explosion risk from coal dust.

Durham NCB's New Heat Service Centre

NEW showrooms of the Durham Divisional Coal Board, to be known as the Heat Service Centre, are to be opened in Newcastle today (Friday), by Mr. Alfred Robens, chairman of the National Coal Board.

The Heat Service Centre, first of its kind in the north, is designed to give expert guidance on the use of all forms of solid fuel. A round-the-clock service will be provided, a machine recording telephone messages at night when the office is not manned.

LARGE COKING PLANT is to be built by Didier-Werke, AG, Essen, West Germany, for the Fuji Iron & Steel Company, Limited, Tokyo. The plant, to serve a new steelworks, will consist of four batteries with 100 coke ovens.

Passing Thoughts . . .

I DO not apologize for any shortcomings of the British exporter. We have stupid ones, but if the products of British skill are as bad as the Press would have us believe, there must be a lot of stupid foreigners in the world. For the money we are making is an awful lot to make for the sort of rubbish, which, according to the Press, we are selling overseas.—MR. A. J. TOWNSEND, secretary and director of the Institute of Export.

> *It is no good waiting for customers to visit you. They won't come. It is no good quoting to foreign people in sterling prices net at works. They don't understand. It is no good providing catalogues in basic Sheffield when they are needed in Spanish.*—MR. RUBEN VINER, *president of the Sheffield Cutlery Manufacturers' Association speaking at the association's annual dinner.*

. . . It is a question of EXPORT ACTION NOW, with strong emphasis on NOW; and I maintain that at the present time very few British salesmen are sufficiently good linguists to sell our goods abroad. So let us be realistic about it and, with English-speaking foreign salesmen, fill the gap . . . between now and the time when a new generation of salesmen is knocking on overseas doors.—MR. RICHARD POWELL, director-general, Institute of Directors, in a letter to the Financial Times.

> *There is a kind of cynical apathy towards exports. It seems the only anxiety in the public mind is about football. Nobody worries to the same extent whether the nation's bread and butter will be secured by exports.*—MR. CYRIL OSBORNE, *Conservative MP for Louth, in the House of Commons.*

While oil is at present contributing only about 23 per cent. of our total energy needs, it is already the biggest single item in Britain's imports bill. Surely, with recurrent talk of balance of payments crises the sound policy would be to make the most of the resources we do possess, instead of adding to our burdens by increasing our imports of fuel—whether in the form of oil or coal.—MR. GEOFFREY KIRK, chief public relations officer, National Coal Board, in a letter to the Guardian.

> *Everyone will be pleased when ponies are no longer needed in the pits. The place for a pony is in the daylight where the grass grows green, even if its only function in modern society is to carry pony-tailed hippophiles for their week-end sport.—Daily Herald.*

Yorkshire Pit to Close in 1964

TOWARDS the end of 1964 Altofts West Riding Colliery will close, with the resultant redundancy of 800 men, Mr. Dean Harrison, general manager of the No. 8 (Castleford) Area of the North-Eastern Divisional Coal Board, has told Normanton Urban Council. The closure would not affect the adjoining Fox Pit, he said, and the majority of the men made redundant by the closure will be transferred to the new Kellingley Colliery, while the rest will be absorbed in other local pits.

The town council is worried about the town's industrial future and is looking to the railways to provide fresh employment.

Breakthrough in 1962

COAL INDUSTRY WILL CLEAR ITS ACCOUNTS

THIS year the coal industry would "keep its nose clean" concerning the revenue account, and 1962 would be the breakthrough year when the industry would be able to clear its accounts, Mr. Alfred Robens, chairman of the National Coal Board, said in London last Friday. He was speaking as guest of honour at the annual dinner of the Institute of Plant Engineers.

After referring to the importance of maintaining price stability, Mr. Robens said that this year the NCB would launch the biggest mechanization drive in the mining industry. "We are poised ready with plans, and are only waiting for the winter to end. At the moment we have 40 per cent. of coal power-loaded, and my aim is to get 80 per cent. It means a tremendous increase in output per man-shift."

Mr. Robens told the Institute that "we have one of our 'secret' machines working in which we are using the spray-back from gamma rays which will operate in a seam narrower than in which men can work." He said that in five years or less, 80 per cent. of the coal produced from British mines would be coming from new pits or pits that had been completely reconstructed.

New Notts Power Stations

APPROVAL has been given by the Ministry of Power to the Central Electricity Board's proposal to build the first of two coal-fired power stations in Nottinghamshire at West Burton. The first generating unit will be commissioned in 1965 and, when complete two years later, the station will have a total capacity of 2,000,000 kW. It will burn about 5,000,000 tons of low grade coal a year from the northern sector of the East Midlands coalfield. Its cost is put between £50,000,000 and £60,000,000.

The station will be the most powerful steam station in western Europe. Its four turbo-generators will each have an evaporative capacity of 3,450,000 lb. of steam an hour which will reach the turbine stop valves at a pressure of 3,450,000 lb. p.s.i. and a temperature of 1,050 deg. F. with a reheat to the same temperature.

The setting up of a second similar station at Holme Pierrepont depends on the findings of the public inquiry which ended at Nottingham in January. If approved this station will absorb a similar tonnage of coal from the southern part of the coalfield.

TV Presents Coal and Steel in the North

FILMED with the help of the National Coal Board and the Consett Iron Company, Limited, a programme about a region where natural resources have played a major role in the development of heavy industries is to be presented by BBC TV next week.

Introduced by Mr. Geoffrey Johnson Smith, MP, the programme, in the "Looking at Britain" series, will deal with coal and steel in north-east England. The first showing will be at 11.5 a.m. on Monday and there will be a repeat at 2.5 p.m. on Friday.

Mine Deputies Face the Future with Confidence

CONFIDENCE that underofficials in the mining industry would be able to meet the challenge of new methods and equipment was expressed on Saturday by Mr. J. Crawford, general secretary of the National Association of Colliery Overmen, Deputies, and Shotfirers. It had been a big step, he said, to take the pick and shovel from the men and give them a pneumatic pick and teach them it was their friend. "Perhaps we will have to take bigger steps in the future, but I am confident that we will display the same loyalty, enthusiasm, and farsightedness to make new schemes a success," he told members of the North Staffordshire branch of the association at their annual dinner.

He said that the wisdom of the association in retaining its separate identity on nationalization had been proved in the fact that there had never been an official stoppage by its members. While the association would continue to follow the principles of trade unionism, it would continue in the same spirit of co-operation as it had since nationalization.

Mr. H. J. Widdowson, general manager of the North Staffordshire Area of the West Midlands Divisional Coal Board, said that the Area would finish 1960 with "something in the black and not in the red," an achievement largely a result of the leadership and help of underofficials. He believed that the industry could now begin to look forward to better things.

Coal Washery and Refractory Plant Projects in India

AGREEMENT signed between Indian and Russian representatives in Delhi on Tuesday provides for Soviet credit of £45,000,000 to finance six projects in India's third five-year plan. The projects include a hydro-electric power station at Bhankra, an oil refinery in Gujerat, a coal washery in Bihar, refractories plant near Bhilai, and the production of pumps and compressors.

This is the second instalment of Russian aid under the third plan, for which a total of £135,000,000 has previously been allocated.

WORK has begun on building a new pump test house and a new research laboratory at the Bedford works of W. H. Allen Sons & Company, Limited. The pump test house which will contain a 30-ton crane and a large sump, 20 ft. deep by 32 ft. by 21 ft., will provide every facility for the testing of pumps of all capacities up to 120,000 gall. of water per minute

Personal

Mr. CLIFFORD PAINE, an executive director of Imperial Chemical Industries, Limited, has been elected a Fellow of the Royal Society of Arts.

Mr. CECIL M. MORRIS, a director of J. P. Hall & Sons, Limited, pump manufacturers, of Peterborough (Northants), has been elected to Peterborough City Council.

Fischer & Porter, Limited, has asked us to state that Mr. H. WILLIAMSON will remain managing director of the company as well as becoming managing director of Fischer & Porter, NV.

Chairman of W. H. Allen Sons & Company, Limited, Bedford, and Gwynnes Pumps, Limited, Lincoln, Mr. W. KENNETH G. ALLEN, is to make an extended business tour of Australia during March and April.

After 40 years' service with Hemmings & Company, wire manufacturers, etc., of Sheffield, Miss ELEANOR ALDERSON has retired. Presentations were made by Mr. Jack Hemmings, managing director, and colleagues.

Manager of the Midlands office of L. H. Van Moppes & Sons (Diamond Tools), Limited, Basingstoke, Mr. Mr. R. A. STRAKER-NESBIT, recently received a presentation to mark his 25 years' service with the company.

Mr. H. F. SPENCER, managing director of Richard Thomas & Baldwins, Limited, has accepted appointment as president of the British Iron and Steel Research Association in succession to the late Sir Charles Bruce-Gardner.

Secretary of the Yorkshire Mineworkers' West Riding Approved Society, Mr. FREDERICK ELLIOTT, formerly an NCB industrial relations officer, has been nominated by the Labour group of Barnsley Town Council to be the town's next mayor.

Guest of honour at the annual dinner of the Junior Chamber of Commerce in Sheffield today (Friday), is M. GEORGES BERTHOIN, Chargé d'Affaires of the delegation to Britain of the High Authority of the European Coal and Steel Community.

Possibility of establishing a Malta agency of William Boby & Company, Limited, water treatment engineers, of Rickmansworth (Herts), is to be investigated by Mr. MICHAEL BOBY, the managing director, during a seven-day visit to the island which he began on Wednesday.

First turf on the site of the £33,000,000 steelworks which the Park Gate Iron & Steel Company, Limited, is to build at Aldwarke, near Rotherham (Yorks), will be cut on March 24 by Lord PLOWDEN, deputy chairman of the parent company, Tube Investments, Limited, and chairman of its iron and steel division.

On her return to India from Pakistan the QUEEN visited the giant steelworks which is nearing completion at Durgapur. Financed to the extent of £15,000,000 by the British Government, with a further £11,500,000 provided by British banking houses, the steelworks has been built by a consortium of 13 British firms.

New chairman of the Electronic Engineering Association is Dr. D. N. TRUSCOTT, of the General Electric Company, Limited. He succeeds Mr. L. T. HINTON. Mr. W. D. H. GREGSON, of Ferranti, Limited, has been elected vice-chairman in succession to Mr. R. R. C. Rankin, of Mullard Equipment, Limited.

Herr WALTER HITZINGER has resigned as managing director of Austria's biggest steel company, Vereinigte Osterreichische Eisen-und Stahlwerke, AG, (VOEST), of Linz, to become managing director of Daimler-Benz, AG, of Stuttgart. His place at VOEST is taken by Dr. F. KOLLER, hitherto director of the VOEST plant at Krems, Austria.

Information officer of the research and development department of the United Steel Companies, Limited, Sheffield, Mr. R. SEWELL is one of the speakers at a one-day conference on "New Technical Libraries in Industrial Organizations," which the Association of Special Libraries and the British Institute of Management are holding in London on March 14.

Study group from the British Export Council for Europe visited Portugal this week. The group comprised Mr. O. F. REICHWALD of Daniel Adamson & Company, Limited, Mr. HUGH NEILL, deputy chairman and joint managing director of James Neill & Company (Sheffield), Limited, steel manufacturers, and Mr. A. R. GLEN, of H. Clarkson & Company, Limited, shipbreakers.

Area agent of North Staffordshire of the National Union of Mineworkers, Mr. HAROLD LOCKETT, is to retire in May on reaching the age of 65. He has been a full-time NUM official since 1941. So far 14 nominations have been received for the vacancy. These will be reduced to six in a preliminary ballot and the winner is expected to be announced at the NUM Midland Area conference on April 17 and 18.

Group manager of the "E" group of collieries in the Northern Northumberland Area of the Northern (N&C) Divisional Coal Board, Mr. T. J. HUGHES has retired. A member of the National Association of Colliery Managers, he has served on the Cumberland branch council of the association. He is succeeded by Mr. A. Z. LANG, agent/manager of Lynemouth Colliery. Mr. Lang is succeeded by Mr. T. E. L. SMITH, manager of Woodhorn Colliery, in the "D" group of the Area.

AEI Makes Executive Changes at Rugby

THREE appointments are announced by Associated Electrical Industries (Rugby), Limited. To fill the position previously occupied by the late Mr. E. T. W. Barnes, Mr. D. Edmundson, general manager, Rugby works, since January 1960, is appointed manufacturing manager, electronic apparatus division. Mr. G. P. Thompson, until recently manager, manufacturing, at Rugby, becomes manager, Rugby works. Mr. E. T. Muston, since 1949 superintendent of the fabrication factory, is appointed general superintendent, Rugby works.

After early appointments as a design engineer and liaison engineer with the motor department of the British Thomson-Houston subsidiary, Mr. Edmundson was made head of the electrical laboratory in 1940 and in 1946 he became superintendent, test department. He was promoted manager, manufacturing, in 1959 and visited various countries on behalf of the company. Mr. Edmundson is chairman of the Engineering Advisory Committee, Rugby College of Engineering Technology.

Mr. Thompson joined the subsidiary, British Thomson-Houston, as a student apprentice in 1930 and progressed through various technical appointments until he became manager, manufacturing, at the Rugby works in January, 1960. Mr. Muston joined the British Thomson-Houston company in 1918 and served an apprenticeship as a toolmaker and designer. He left the company for two years, but returned in 1928 and eventually became general foreman of the press department in 1936. After a period at the Peterborough works, latterly as superintendent, he returned to Rugby in 1949 on his appointment as superintendent of the fabrication factory.

Steel Shares Offer

£85,000,000 SECURITIES FOR PUBLIC SALE

FINAL arrangements are being made by the Iron and Steel Holding and Realization Agency for the public offer of £85,310,000 worth of fixed interest securities to the public. These are the debentures, unsecured loans, and preference shares of the steel companies that have already been denationalized by the previous public sale of their ordinary capital. Twelve separate securities relating to seven companies are involved. Details of the terms will be advertised on Monday, and application lists will open at the Bank of England on Thursday and close the following Friday afternoon.

Separate application lists will be opened for each security, it is stated, and applications may be made for any or all of the securities. Each application must be for £100 stock or 100 shares or a multiple; 10 per cent. of the nominal amount will be payable on application. Subsequent instalments vary for the individual securities and the dates have been spread over a period of about eight months.

Yield to final redemption is approximately 6⅝ per cent. in the case of the debentures, and 6¼ per cent. in the case of the loan stock. The flat yield on the preference shares is approximately 7½ per cent. (in calculating these yields, account has been taken of the fact that the first interest-dividend payment will in every case be in excess of interest at the above rates on the instalment money).

Underwriting Consortium

Arrangements are in hand whereby a consortium of eight City houses, led by Baring Brothers & Company, Limited, will underwrite the whole of the offers on terms which will provide that they will put in, or procure to be put in, special applications for approximately 75 per cent. of their total underwriting commitment. These applications will be accepted in full, except to the extent that the Agency has, before the opening of the lists, been requested to treat such special applications on the same basis as those from the public.

The securities to be offered and their price, with the gross proceeds from each in parentheses, are as follows:

Colvilles, Limited, 4,000,000 5½ per cent. preference £1 shares, 15s. 6d. a share (£3,100,000), and £9,640,000 4½ per cent. debenture stock, 1975-85, £75 per £100 stock (£7,230,000); Consett Iron Company, Limited, £3,924,150 5 per cent. debenture stock, 1975-85, £81 per £100 stock (£3,180,000); Dorman Long & Company, Limited, 5,000,000 5½ per cent. preference £1 shares, 15s. 6d. a share (£3,870,000), and £10,000,000 4½ per cent. unsecured loan stock, 1969-74, £80 per £100 stock (£8,000,000); John Summers & Sons, Limited, 4,000,000 5½ per cent. preference £1 shares, 15s. 6d. a share (£3,100,000).

Steel Company of Wales, Limited, £40,000,000 5½ per cent. debenture stock, 1980-85, £87 per £100 stock (£34,800,000); Stewarts and Lloyds, Limited, 5,000,000 5½ per cent. preference £1 shares, 15s. 6d. a share (£3,880,00), and 5,000,000 5½ per cent. redeemable preference £1 shares, 15s. 6d. a share (£3,870,000); United Steel Companies, Limited, 5,097,000 4½ per cent. preference £1 shares, 12s. 9d. a share (£3,250,000), 4,000,000 5¾ per cent. redeemable preference £1 shares, 16s. 3d. a share (£3,250,000), and £9,600,000 4½ per cent. debenture stock, 1968-78, £81 per £100 stock (£7,780,000).

On completion of the offers, the Agency will hold no securities in Colvilles, Consett Iron Company, Dorman Long & Company, or United Steel Companies. The Agency book values of the securities at present held in these companies, with the gross proceeds of the offer in parentheses, are:—Colvilles, £8,870,000 (£10,330,000); Consett, £710,000 (£3,180,000); Dorman Long, £10,290,000 (£11,870,000); United Steel, £14,870,000 (£14,280,000), making a total Agency book value of £34,740,000, against total gross proceeds of £39,660,000.

The position in the three remaining companies is as follows: John Summers & Sons—against an Agency book value of £10,740,000, the gross proceeds of the offer will amount to £3,100,000, and the Agency will still hold £8,000,000 4½ per cent. unsecured loan stock 1962-64; Steel Company of Wales—against an Agency book value of £61,820,000, the gross proceeds of the offer will amount to £34,800,000, and the Agency will still hold £25,000,000 5¾ per cent. second debenture stock 1964-87, plus an outstanding loan of £18,000,000 owing by the company to the Agency (with an Agency book value of the same amount); this loan is repayable not later than 1964.

Stewarts and Lloyds—against an Agency book value of £12,090,000, the gross proceeds of the offer will total £7,750,000, and the Agency will still hold £10,000,000 4½ per cent. unsecured loan stock 1964.

It is explained that in the above particulars, "Agency book value" broadly means the difference (before the present offer) between (i) the Agency's total investment in the company concerned (that is, in general, compensation value plus subsequent investments) and (ii) realizations to date (for example, sales of equity; redemptions of debentures).

Britain Helps Foreign Industrial Relations Officers

GROUP of personnel managers and industrial relations officers from Brazil, Ceylon, Jamaica, Malaya, the Philippines, and Thailand, who are in the UK on a course organized by the British Council, have now visited firms and labour organizations in London, Manchester, and Liverpool.

By studying practice in this country it is hoped that the delegates will learn something of value in the rapid industrialization of their countries.

Appointments

From NCB Area to Divisional Post

SAFETY engineer in No. 6 (Nottingham) Area, of the East Midlands Divisional Coal Board since 1959, Mr. THOMAS FREDERIC BAMBER has been appointed safety engineer for the Division. He joined the NCB in January, 1954, as ventilation engineer in No. 6 Area after 11 years as research assistant and lecturer in mining at Sheffield University. He succeeds Mr. W. A. Wood, who, on February 1, moved to London as the NCB's chief safety engineer.

Mr. Bamber was educated at Heanor and was a mining student with the Butterley Company, Limited, before taking his mining degree at Sheffield University in 1943. He is a member of the Institution of Mining Engineers, and is the honorary secretary of the Midland Counties Institution of Engineers.

Mr. COLIN BROOME has been appointed representative for Yorkshire of the Globe Pneumatic Engineering Company, Limited.

Dr. W. DAVIDSON has been appointed in charge of the research and development for the heating division of Powell Duffryn, Limited.

Mr. A. J. C. FAGG has joined the staff of J. I. Case Company, Limited, construction equipment manufacturers, of West Drayton (Middx), as sales administrator.

In succession to the late Mr. Eric Clare, Mr. ARNOLD MESSENGER has been appointed general manager of the Eastwood rolling mills of Ben Bennett, Jr., Limited, iron and steel makers, of Rotherham.

Following the retirement of Mr. W. Winter, Mr. J. HENDERSON has been appointed general works manager of C. A. Parsons & Company, Limited. He was previously assistant general works manager.

Mr. H. G. DORN has been appointed contracts manager of Vickers-Armstrongs (Aircraft), Limited. He joined Vickers-Armstrongs, Limited, in 1953 and was appointed military contracts manager in 1959.

Mr. ALBERT CHAMBERS has been appointed assistant secretary of Newton, Chambers & Company, Limited. A direct descendant of the co-founder of the company, he joined the secretary's department in 1937.

MR. JAMES OLDROYD, who has been secretary of the British Electrical and Allied Manufacturers' Association since 1952, has been appointed general manager of the Lead Development Association and will take up his duties in April.

Senior lecturer in the department of metallurgy at Nottingham University, Dr. H. K. M. LLOYD is to succeed Prof. W. R. D. Jones as Professor of Metallurgy at the University College of South Wales and Monmouthshire, Cardiff, from September 1.

Mr. PHILIP W. COPELIN, chairman and managing director of Vauxhall Motors since 1955, is resigning to become manager of the New York staff of General Motors Corporation. He will be succeeded by Mr. WILLIAM SWALLOW, at present chairman and managing director of General Motors, Limited, London.

Executives of Simon-AMF, Limited, which was formed by Simon Engineering, Limited, in January to sell and install throughout the world a complete range of bakery equipment, are as follow:—Mr. D. G. ELIAS, general manager; Mr. K. BESWICK, secretary and commercial manager; Mr. W. G. CULPIN, engineering manager; and Mr. J. J. DEVLIN, technical manager.

When Mr. J. H. Maxwell retires as general manager of W. T. Glover & Company, Limited, at the end of June, he will be succeeded by Mr. E. P. G. THORNTON, a director and joint assistant general manager. Until that time Mr. Thornton will act as deputy general manager. Mr. W. R. GIBB, a director and joint assistant general manager, has been appointed assistant general manager and will deputise for Mr. Thornton in his absence.

Mr. J. A. MCINTOSH, works manager of Lane & Girvan, Limited, ironfounders, of Bonnybridge (Stirlingshire), has taken up an appointment as instructor in foundry practice at Coatbridge Technical College.

Undermanager at East Hetton Colliery (Co. Durham) for the past three years, Mr. F. CHARLTON has been appointed manager of Bowburn Colliery (Co. Durham), following the retirement through ill health of Mr. W. L. Lowson.

Metallurgy Fellowships at Sheffield University

HOLDER of the new Speedicut research fellowship in mechanical engineering at Sheffield University is Dr. D. S. Dugdale, who was last year in the Illinois Institute of Engineering. He formerly worked with the Bristol Aeroplane Company, Limited, and as a research worker in the Department of Scientific and Industrial Research laboratories.

Among other fellowships approved by the university council, Mr. J. Beech has been appointed to the United Steel Companies, Limited, research fellowship in metallurgy, Mr. D. H. Warrington to the J. H. Andrews research fellowship in metallurgy, and Mr. A. Mitchell to the C. H. Desch research fellowship in metallurgy at the university. Mr. Beech is a Sheffield University graduate, Mr. Warrington was educated at Cambridge, and Mr. Mitchell at Oxford.

AEA Forms Engineering Group

ONE of a number of major changes in the organization of the UK Atomic Energy Authority is the burning of solid, liquid, and gaseous fuels in boilers plants for fuel processing, inspection, and similar techniques, under a newly-formed engineering group. This will be under the direction of Sir Leonard Owen, who was previously member for production.

The object of the change is to ensure that reactor development does not dominate and over-ride engineering developments connected with the vital and very large production plants for fuel processing and similar operations needed to sustain the country's atomic energy industry.

REFRESHER COURSE for engineers concerned with the burning of solid, liquid, and gaseous fuels in boilers and furnaces, will be held at Prestatyn Holiday Camp from May 29 to June 3. Details and application forms may be obtained from: Mr. C. K. R. Davies, Secretary to the Course, National Industrial Fuel Efficiency Service, Baltic House, Mount Stuart Square, Cardiff.

CO-OPERATION AGREEMENT has been signed between C. H. Johnson (Machinery) Limited, manufacturing engineers and makers of contractors' plant, of Stockport (Ches), and Spanner Baumaschinen, GmbH, of Frankfurt, and its selling agency, J. Wormser, AG, Zurich, for the development of the common products of each company in the European Common Market areas, and the EFTA areas.

ECSC 1961 Coal Forecast

LAST YEAR'S RISE ONLY TEMPORARY

INDUSTRIAL growth within the European Coal and Steel Community during 1961 is expected to rise by 7 per cent., compared with the 12 per cent. increase last year. Stating this in its middle-term coal report for 1961, the High Authority of the ECSC states that the upward trend in the coal industry evident last year is regarded as temporary. Over the next two or three years, household consumption, coking plant consumption, and coal exports from the community are expected to drop.

The report cites West Germany as an area where the struggle between energy sources will continue, and at the recent High Authority meeting a further decision on the reorganization of the Ruhr coal-selling agencies was made. It is expected that at the beginning of the next coal year, on April 1, there will be an extension to the rights of individual merchants, both in Germany, and other ECSC countries, to buy direct from the Ruhr mines.

The criterion is expected to be the purchase in 1960 of at least 6,000 tons from any one of the existing selling agencies, whose monopolistic organization has been worrying the anti-cartel divisions of the ECSC Treaty.

French Coal Buying Agreement

Detailed figures for West German coal imports last year show that of the 8,610,000 (8,690,000) metric tons imported, imports from fellow ECSC members rose from 1,412,000 tons to 1,767,000 tons. Imports from the UK rose to 399,000 (231,000) tons.

The High Authority has reached an agreed out-of-court settlement with the French Government on the question of French regulations concerning the purchase of coal from the other community countries. French buyers will be able to make purchases from non-French suppliers, and ATIC foregoes the sole right to negotiate such purchases, and will in future submit its activities with regard to non-French coal to the supervision of the High Authority. Following this settlement, French users and purchasers who fulfil the necessary conditions under French law will have direct access to coal offered by producers or selling agencies in some other country of the Community and will continue to use ATIC as the formal channel for the conclusion of contracts for the purchase of non-French coal.

In the first month of this year the coal production for the whole of the ECSC was 19,754,000 tons, compared with 20,191,000 tons in January of 1960, and 19,744,000 tons in December.

A ROD MILL engineered and built by Schloemann, AG. Düsseldorf, together with the related billet mill, has now been put into operation by the Kobe Steel Works, Limited, Japan. The billet mill comprises four and the rod mill 35 stands. Four-strand rolling is done in the roughing train, two-strand in the intermediate and finishing trains. Rod from 0.197 in. to 1¼ in. gauge is produced.

Durham Miners Win Invention Awards

AWARDS of £100 each from the National Coal Board Panel on Awards for Inventions, have been won by Mr. H. Collins, manager, and Mr. G. Bell, underground fitter chargehand, at Handen Hold Colliery, County Durham. The men collaborated on a method of supporting conveyor rollers from the roof. Mr. Collins and Mr. Bell had previously received awards from the Durham Divisional Panel for their invention.

The Coal Board scheme for awards for technical ideas and inventions is open to all its employees and has been in operation for many years. Awards are made on the basis of use of the invention, or idea, and financial saving over other methods.

Durham Divisional Panel made a number of cash awards at its last meeting, including one to Mr. R. B. Pyle, garage foreman in North-West Durham Area, for a device which will sound an alarm should there be an attempt to hold up a pay-carrying van. Mr. R. Boyd, manager, and Mr. C. Foreman, electrical engineer, at Washington "F" Colliery, received recognition for an alarm system for use in powder magazines, while a device to ease the movement of a plough conveyor, won an award for Mr. H. Smith, mechanical engineer, Silksworth Colliery.

Two awards went to Mr. R. Smith, assistant to No. 5 (Mid-West Durham) Area mechanization engineer. The first for a high-pressure water infusion pump and the second, in collaboration with Mr. E. G. Pearson, mechanical engineer, Beamish Mary Colliery, for an anti-spillage chute for skip winding. Others to receive awards included Mr. G. Burgon, No. 5 Area mechanization engineer and Mr. B. Johnson, mechanic, Beamish Mary Colliery.

MINING QUALIFICATIONS BOARD NEW APPOINTMENTS

SECRETARY of the National Association of Colliery Overmen, Deputies and Shotfirers, Mr. J. Crawford, and Mr. W. J. Morris, principal of the Technical College, Cowdenbeath (Fifeshire), have been appointed members of the Mining Qualifications Board.

Mr. Morris succeeds Mr. C. E. Pulford, principal of Ashington Technical Colege, who has completed his term of office.

Board Changes

New Chairmanship for Sir Peter Roberts

CHAIRMAN of the Wellman Smith Owen Engineering Corporation, Limited, Sir Peter Roberts, has been appointed chairman of BARROW BARNSLEY (HOLDINGS), LIMITED. Sir Peter, who is also chairman of Newton, Chambers & Company, Limited, and a director of the Staveley Coal & Iron Company, Limited, holds a number of positions on other company boards.

Appointed directors of Barrow Barnsley (Holdings) are Maj. J. Bartholomew, Mr. C. P. R. Bowen-Colthurst and Mr. W. A. P. Hoskin. Mr. J. Richards, managing director of Barnsley District Coking, Limited, a wholly-owned subsidiary company, has been elected chairman of that company.

ALFRED HERBERT, LIMITED—Mr. V. N. Brailsford has joined the board.

AERIALITE, LIMITED—Mr. W. M. Chapman-Walker has been appointed a director.

WILLIAM PICKLES & COMPANY, LIMITED—Mr. D. F. Hamer has resigned from the board.

BENGEWORTH STEELS, LIMITED—Mr. E. J. Ingram has been appointed managing director.

ALUMINIUM, LIMITED—Mr. M. P. Weigel, of Montreal, director of operations, has been elected to the board in place of the late Mr. C. D. Howe.

PETER BROTHERHOOD, LIMITED—Mr. Kenneth Grant, assistant general manager, and Mr. Albert Frank Wainwright, chief accountant, have been appointed directors.

THOMAS ROBINSON & SON, LIMITED—Mr. John L. Graham and Mr. Denys W. Povey have joined the board following the retirement of Mr. Leslie Smith and Mr. J. H. Dex.

CAMPBELL, GIFFORD & MORTON, LIMITED—Mr. D. L. Campbell has resigned from the board on his appointment as managing director of the Davy-Ashmore Export Company, Limited.

CHURCHILL MACHINE TOOL, LIMITED—Following the acquisition of the company by the Birmingham Small Arms Company, Limited, Sir Greville S. Maginness has resigned as chairman.

ASSOCIATED ELECTRICAL INDUSTRIES, LIMITED—Mr. Ronald L. Basset has joined the board and has therefore resigned from the board of Associated Electrical Industries (Woolwich), Limited.

BRITISH TIN INVESTMENT CORPORATION, LIMITED—Mr. Charles F. Geddes has joined the board and those of the subsidiaries, BTIC (Overseas), Limited, and Tin Industrial Finance & Underwriting, Limited.

RUSTON-BUCYRUS, LIMITED—Mr. E. S. Everitt, managing director, and a director of Bucyrus-Erie Company, South Milwaukee, US, has been appointed a director of Ruston & Hornsby (Australia) Pty., Limited.

SIR LINDSAY PARKINSON & COMPANY, LIMITED—Mr. F. E. Griggs has joined the board and been appointed a director of the newly registered property investment company—Parkinson Griggs Developments, Limited.

PALMER AERO PRODUCTS, LIMITED—Mr. C. G. Erlam has been appointed chairman of the company, a subsidiary of B.T.R. Industries, Limited. Mr. P. L. Watson and Mr. J. A. Hemingway have joined the board.

ASSOCIATED BRITISH MACHINE TOOL MAKERS, LIMITED—Mr. J. W. Butler has been elected chairman in place of Sir Greville S. Maginness, who has resigned. Mr. E. Williams has been elected deputy chairman. Mr. Edward Parkinson has resigned from the board.

BLACKSTONE & COMPANY, LIMITED—Mr. E. Joyce and Mr. Charles Pratt are retiring from the board on March 31. Mr. Joyce joined the company in 1904 and was appointed a director in 1947, and Mr. Pratt joined the board in 1936.

JOHN HALL & SONS (BRISTOL & LONDON), LIMITED—Mr. Victor Thompson, works director, has been appointed deputy managing director to Mr. A. S. Hooper. Mr. R. W. Linnell has joined the board and retains his position as chief accountant.

POWELL DUFFRYN, LIMITED—Mr. G. A. H. Jones and Mr. S. J. L. Hill have joined the board. Mr. Jones is managing director of Stephenson Clarke, Limited, and Mr. Hill is managing director of Cory Bros. & Company, Limited, both subsidiaries.

R. & J. BECK, LIMITED—Mr. J. W. Haig-Ferguson has been appointed managing director. Responsible for the newly-formed electronics division of the company, Mr. Haig-Ferguson was formerly divisional director (electronics) of Bruce Peebles & Company, Limited, Edinburgh.

PADLEY & VENABLES, LIMITED—Mr. Edward Ambrose Martin, manager and local director of the London office, has been appointed to the board. He is president of the British Compressed Air Society and represents the society on the council of the British Engineers Association.

MASSEY-FERGUSON (UNITED KINGDOM), LIMITED—Mr. Eric W. Young has been reappointed chairman, the position he relinquished in 1959 when Mr. A. A. Thornbrough, president of the parent company, became temporary managing director of the UK company. Mr. Young is deputy chairman and managing director of Massey-Ferguson Holdings, Limited.

£34,000,000 Orders Placed for New Power Station

ORDERS worth £34,000,000—the largest yet put out by the Central Electricity Generating Board for coal-fired power stations—are being placed with the English Electric Company, Limited, and the International Combustion, Limited, and Simon-Carves, Limited, group. They are for generating and boiler equipment for the projected West Burton station, near Gainsborough (Notts), which will be the most powerful steam-power station in Western Europe. It will cost about £70,000,000 and will have a capacity of 2,000,000 kW.

International Combustion is to supply, at a cost of about £19,000,000, four 500,000 kW reheat boiler units. They will be of the controlled circulation type, skin cased, and arranged for cubic expansion down to the economizer outlet.

Following the agreement last October for a closer co-operation between International Combustion and Simon-Carves, the two companies have agreed the responsibilities of each for carrying out the contract, and the technical facilities of each organization best suited to each section of the contract will be used.

English Electric will supply four 500,000 kW, single-line turbo generators, together with condensers and steam-turbine driven boiler feed pumps, the order being worth £15,000,000. The first of the 500,000 kW units is programmed to be in full commercial operation in June, 1965, followed by the remainder at nine-monthly intervals. The whole station will thus be fully commissioned by the end of 1967.

Obituary

SIR CHARLES REID

Mining Expert and Original Member of the NCB

SIR CHARLES REID, one of Britain's outstanding mining engineers, who was chairman of the committee which produced the Reid report of 1945 on the reorganization of the coal industry, died in Eastbourne on Sunday aged 82. Until 1942 he was general manager and director of the Fife Coal Company, Limited. He was production director, Ministry of Fuel and Power, from 1942-45 and a member of the National Coal Board from 1946-48. Sir Charles had held the comparatively rare distinction of honorary membership of the National Association of Colliery Managers for many years.

Sir Charles was born in Fife and started work as a colliery clerk, going down the pit at the age of 14. He became assistant to the manager at Aitken Colliery, Fife, and then manager of Donibristle Colliery.

When this pit was absorbed by the Fife Coal Company, he was made agent to a group of that company's pits, and by 1923 he was general manager of the whole of its workings. In 1931 he was appointed a director, and a few years later general manager. The year 1942 saw him seconded as Regional Production Director of Scotland under the Ministry of Fuel and Power, and a year later he became Director of Coal Production for Great Britain.

Report on the Industry

In October, 1944, Sir Charles was chosen by the Minister to preside over an expert committee to report on the technical changes required to bring the coal mining industry "to a state of full technical efficiency," and what became known as the Reid Report was published in April the following year, becoming a text book for the general reorganization of the industry.

Afterwards, Sir Charles, who was knighted in June, 1945, became one of the original members of the National Coal Board and was one of its two production directors. In 1948, however, he resigned this position, declaring that he had no confidence in the board or in the organization it had set up. Shortly afterwards he returned to serve as a director of the Fife Coal Company.

With an international reputation as a mining engineer, Sir Charles was a past president of the Mining Institute of Scotland, and a medallist of the Institute of Mining Engineers. He served as president of the Scottish branch of the National Association of Colliery Managers as early in his career as 1912, and his outstanding service to the industry was recognized by his appointment to honorary membership of the NACM, a position he held for many years.

With a unique reputation as a pioneer, Sir Charles saw clearly, long in advance of the industry as a whole, the emergence of coal mining from comparatively simple techniques into a highly complex engineering process, and that this called for a new concept of planning of mining development. His determination to see the industry well organized and technically efficient afforded inspiration to mining engineers throughout the country.

Sir Charles' only son, Dr. William Reid, is now chairman of the Durham Division of the National Coal Board.

Sir Arthur Smout

EMINENT metallurgist and industrialist, Sir Arthur John Griffiths Smout died on Tuesday at the age of 72. He was educated at King Edward's School, Birmingham, and Birmingham Technical College, from where in 1905 he joined the Elliot group of metal companies as a student apprentice. For four years from 1920 he was works manager of Elliot's Metal Company, Limited, and from 1924 to 1934 he was production director to the Elliot Group, Limited, which was later merged into Imperial Chemical Industries, Limited.

Sir Arthur became managing director in 1934 and was chairman from 1934 to 1942 of what is now the metals division of ICI. He was appointed to the main board of ICI in 1944 with responsibility for the company's metal and ammunition interests. During the war he was Director-General of Small Arms Production and when Mr. G. S. McLay, whose services had been lent to the Ministry of Supply by Stewarts and Lloyds, Limited, was released at his own request in 1944, Sir Arthur succeeded him as Director-General of Ammunition Production. In 1937 he was appointed chairman of Pyrotenax, Limited, and in 1953, of Murex, Limited, and Murex Welding Processes, Limited.

Sir Arthur devoted much time and counsel to the advancement of science in industry. He was a Fellow and former president of the Institute of Metals, a Fellow of both the Royal Institute of Chemistry and the Institution of Metallurgists, and was a vice-president of the Institution of Mining and Metallurgy. He was knighted in 1946.

PROF. A. H. COX

ONE of Britain's leading geologists, Pro. Arthur Hubert Cox, died last week, aged 76. He held the chair of Geology at Cardiff from 1918 until

his retirement in 1949, and just before his retirement he was awarded the Lyell Medal of the Geological Society.

In the course of his long and distinguished career he made many important contributions to geological science, particularly in bringing out its value in the economic development of the country. His work on the strata of the South Wales coalfield is well known, but one of his most significant contributions to the mining industry was his research into the relation of secondary silica to the incidence of silicosis. This became an important factor in the complete revision of the compensation schemes for miners affected by the disease.

He was also among the first to appreciate the importance of geophysical methods in the surveying of deep structures, techniques which have now become standard in the search for oil and minerals. He served as a member of the Iron Ore Committee in 1918, the Geophysical Committee in 1929, and the Geological Survey Board in 1938, and was the author of many papers in the Philosophical Transactions of the Royal Society and elsewhere.

MR. JUSTUS SJOGREN

CHAIRMAN of Sandvik Swedish Steels, Limited, Halesowen, Birmingham, and Sandivk Steel Band Conveyors, Limited, Selly Oak, Birmingham, Mr. Justus Sjögren died on Tuesday at the age of 82. Mr. Sjögren came over to this country in 1901 and pioneered the development of the Sandvik organization in Great Britain. He was chairman and managing director of Sandvik Swedish Steels, from 1914 until 1947, when he left the latter post but continued as chairman, and was chairman of Sandvik Steel Band Conveyors from 1921.

Mr. Sjögren formed strong personal relations with Birmingham and was, in fact, Consul for Sweden in Birmingham from 1920 to 1948. He was awarded the Order of Wasa and the Order of Nord Stjärnan (the Order of the North Star), for his contribution to the Anglo-Swedish trade and cultural relations.

The death has occurred, at the age of 73, of Mr. JOHN MCPHIE, a retired colliery training officer, of Mansfield (Notts).

The death has occurred of Mr. HARRY JOHNSTON, managing director of James Murphy of Falkirk, Limited, wireworkers.

Former manager of the Stanhopeburn (Co. Durham), mines of Fluospar, Limited, Mr. WILLIAM HERDMAN, has died at the age of 75.

Mr. JOHN JOSEPH HARRISON who, four years ago, gave up his work as an official at Wheatley Hill Colliery (Co. Durham), to become the first full-time warden at Peterlee Community Centre, has died at the age of 59.

Former northern area manager of the Export Credits Guarantee Department, Mr. MAURICE C. DAY has died at the age of 63. He retired in 1958 after being with the department for 31 years. He helped to establish the northern area office in Bradford.

The death has occurred of Mr. A. I. NEWBURY, who had been employed at the Panteg (Mon) works of Richard Thomas & Baldwins, Limited, for 46 years. For 28 years he was foreman of the sheetwork maintenance department and for three years was an engineer in the physical laboratory department.

The death has occurred after a short illness of Mr. E. LLYN RAWORTH, chairman and joint managing director of McCall & Company (Sheffield), Limited, and McCall's Macalloy, Limited, steel reinforcement manufacturers. He was born in 1899, became founder director of McCalls in 1922, and chairman in 1942.

The death has occurred of Mr. WILLIAM JAMES MCCALL. He was joint partner with his brother in William McCall & Sons, Limited, sheet metal workers, of Glasgow, the company founded by their father. When his brother died Mr. McCall carried on alone until in 1952 he sold his interests in the company and retired.

President of the Lancashire Branch of the National Association of Colliery Managers in 1934-35, Mr. RICHARD CHEETHAM has died at the age of 83. This year he was made an honorary member of the association on the completion of 50 years' service. He was manager of Ashtons Green Colliery (Lancs), from 1912 to 1923, and later became agent of Sutton Manor Colliery. He retired in 1943, but remained with Sutton Manor Collieries, Limited, in a consultative capacity until nationalization.

Memorial Service for Mr. H. W. Hembry

TRIBUTE to the late Mr. Henry William McQuitty Hembry, finance member of the National Coal Board, was paid at a memorial service at the Church of St. Peter, Eaton Square, London, S.W.1, on Monday. The service was conducted by the Rev. W. A. Simmonds.

Mr. Hembry, who had been the board's finance member since January, 1957, died at his London home on February 1. He was 57.

The National Coal Board was represented at the service by Mr. Alfred Robens (chairman), Mr. E. H. Browne (deputy chairman), and other members and former members and other personnel. Divisional chairmen and members of divisional Coal Boards were also present. The congregation also included Sir James Bowman, Sir Andrew Bryan, Mr. Richard F. Wood (Minister of Power), Sir Dennis Proctor (secretary to the Ministry of Power), Mr. S. W. G. Ford (president of the National Union of Mineworkers), and a large number of other representatives of organizations in the industry.

The lesson was read by Mr. C. A. Roberts, member for staff of the NCB.

"Human Element" in Mine Accidents

AT the Mansfield (Notts), inquest on Mr. Raymond Bull (43), a banksman at Blidworth Colliery, who was crushed between tubs of dirt, Mr. C. A. Mack, the coroner, said: "It seems to me that we are meeting far too many cases where the human element comes in." He added that he thought, through familiarity, pit workers sometimes found safety regulations irksome.

Mr. Bull was fatally injured while working on the screening plant at the pit. It was stated that tubs held by compressed air "squeezers," ran forward and trapped him. Ten minutes after the accident the "squeezers" were put to a severe test and were found to work perfectly. An open verdict was returned.

CONSTRUCTION OF *Elliptical Insets* *at Wolstanton Colliery*

by J. S. WILCOX, B.Sc.(Min.)*

Design considerations of elliptical insets are discussed in this paper, which the author presented at a meeting of the North Staffordshire Branch of the National Association of Colliery Managers. He outlines the method of construction of such insets at Wolstanton Colliery, where a large concentration scheme is being undertaken. The insets are of reinforced concrete and, to ensure quality control of the concrete, extensive tests of the compressive strength were made.

PART of the reconstruction of the North Staffordshire coalfield is centred upon a concentration scheme involving Sneyd, Deep Pit, and Wolstanton collieries. Basically, this scheme requires the deepening of the existing No. 2 shaft at Wolstanton to a depth of 1,150 yd. and also the sinking of an entirely new shaft (No. 3) on the same site to the same depth. Through insets at these shafts, connections will then be made to the two other collieries.

The Wolstanton No. 2 shaft, which is in the process of being deepened, has also been widened eccentrically from 16 ft. to 20 ft. and finally to 24 ft. dia. The new No. 3 shaft is being sunk throughout at 24 ft. dia.

On completion of the concentration scheme it is proposed to raise the whole of the output of the three collieries at this new No. 3 shaft. This total output should then be approaching 1,250,000 ton/year or 5,000 ton/day. For this purpose, four large insets will be required in each shaft at 8,650 ft., 8,300 ft., 7,500 ft., and 7,200 ft. above assumed datum (Fig. 1).

Four insets have been completed, one is under construction, and three more are proposed, as shown in Table 1.

TABLE 1.—*Progress of Inset Construction at Wolstanton Colliery.*

Inset.	No. 2 Shaft.	No. 3 Shaft.	Approximate depth.
Ft. above datum.			Yd.
8,650	Completed	Completed	605
8,300	,,	,,	729
7,500	Under construction	Proposed	989
7,200	Proposed	,,	1,089

* Undermanager, Florence Colliery, North Staffs Area, West Midlands Divisional Coal Board.

With the exception of the 8,650-ft. inset in No. 2 shaft, all insets have been, or will be, made in portions of shafts which have a finished inside diameter of 24 ft., the exception being made in a part of the shaft having a finished inside diameter of 20 ft.

Factors Influencing Size of Inset

The duty and purpose for which an inset is designed often dictates its size. When a main inset is to be used chiefly for ventilation duties then no useful purpose is served by making excavations below rail level. The converse is true where an inset is to be used for main coal winding or stowing dirt importation duties. In these cases excavations below rail level are normally required to accommodate decking gear, rams, tilting platforms, etc. Sub-rail level excavations are also required where it is proposed to use simultaneous decking for coal, stone, and materials.

Single- and multi-deck cages may also require insets of differing dimensions. Modifications may be required to allow for additional man-decking platforms so that cage decks may be used simultaneously. Skipwinding installations may require further modifications to be made to inset sizes to cater for that type of plant.

All main insets whether used for ventilation, services, or coal winding, will be passing air quantities in the region of 250,000 cu. ft./min. and above. The cross-sectional area required to keep air velocities within comfortable limits will again influence inset dimensions.

Design Considerations

Elliptical insets have been designed using many theories, including the work of Kommerel and

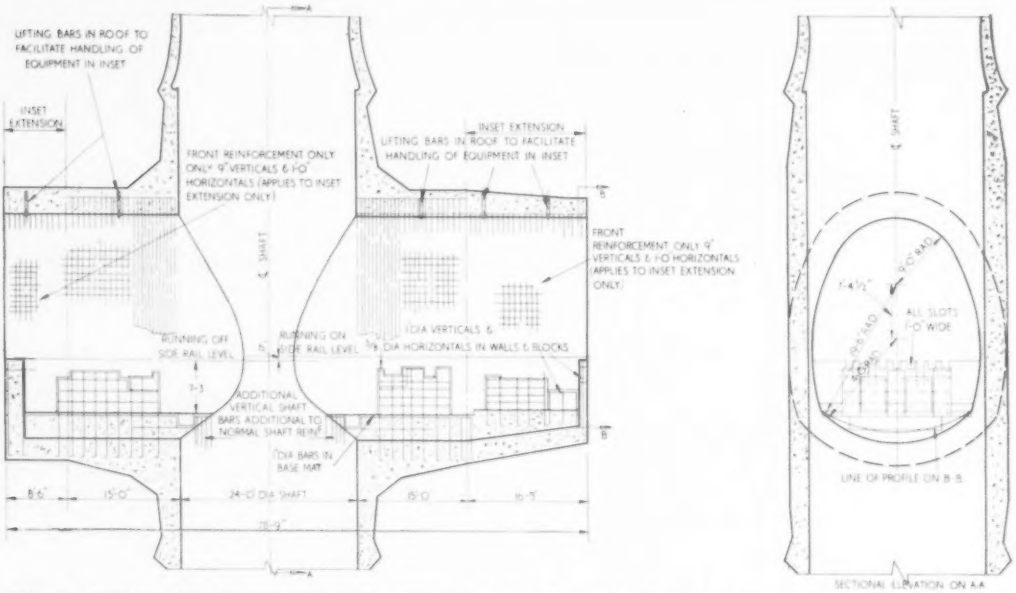
LIFTING BARS IN ROOF TO FACILITATE HANDLING OF EQUIPMENT IN INSET
INSET EXTENSION
FRONT REINFORCEMENT ONLY 9" VERTICALS & F-0" HORIZONTALS (APPLIES TO INSET EXTENSION ONLY)
INSET EXTENSION
LIFTING BARS IN ROOF TO FACILITATE HANDLING OF EQUIPMENT IN INSET
FRONT REINFORCEMENT ONLY 9" VERTICALS & F-0" HORIZONTALS (APPLIES TO INSET EXTENSION ONLY)
℄ SHAFT
RUNNING OFF SIDE RAIL LEVEL
RUNNING ON SIDE RAIL LEVEL
DIA VERTICALS & DIA HORIZONTALS IN WALLS & BLOCKS
ADDITIONAL VERTICAL SHAFT BARS ADDITIONAL TO NORMAL SHAFT REINF
DIA BARS IN BASE MAT
24'-0" DIA SHAFT
℄ SHAFT
ALL SLOTS F-0" WIDE
LINE OF PROFILE ON B-B
SECTIONAL ELEVATION ON A-A

FIG. 1.—DETAILS OF REINFORCEMENT REQUIRED FOR THE STANDARD INSET IN NO. 3 SHAFT, SHOWING A SECTION THROUGH THE CENTRE LINE OF THE SHAFT AND PIT-BOTTOM ROADWAYS.

others. The insets at Wolstanton have been designed chiefly from practical experience gained in the Dutch mines.

An analytical approach to the problem can be made through Timoshenko's equations[1 2 3].

Consider the stresses around an elliptical roadway (Fig. 2):—

let P_1 = vertical stress due to weight of superincumbent strata,
P_2 = horizontal stress as a consequence of P_1,
P_3 = circumferential stress on ellipse walls,

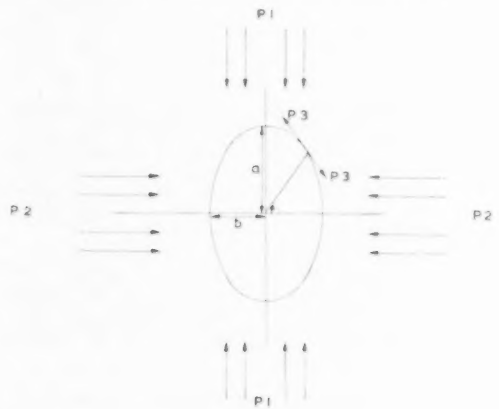

FIG. 2.—STRESSES AROUND AN ELLIPTICAL ROADWAY.

a = vertical semi-major axis,
b = horizontal semi-major axis,
ϕ = angle of radius vector and
m = Poisson's number.

$$k = \text{constant} = \frac{P_2}{P_1} = \frac{1}{m-1}$$

Then, Timoshenko's equation for the circumferential stress is given by:—

$$P_3 = (P_1 + P_2) - 2\,\frac{(a\cos^2\phi - b\sin^2\phi)\,(aP_2 - bP_1)}{(a^2\cos^2\phi + b^2\sin^2\phi)}$$

substituting $\phi = o$ or π and $P_2 = k\,P_1$

then $P_3 = P_1\,(1 - k + \frac{2b}{a})$ = stress in walls in region of maximum width,

also, substituting $\phi = \pm\frac{\pi}{2}$ and $P_2 = k\,P_1$

then $P_3 = P_1\,(k + \frac{2ak}{b} - 1)$ = stress at keystone

For the condition of no tensile stress at keystone:

then $(k + \frac{2ak}{b} - 1) = o$

i.e., $\frac{a}{b} = \frac{1-k}{2k} = \frac{m-2}{2}$

Hence, knowing Poisson's number for the types of strata involved, then the principle dimensions of an ellipse may be calculated. For example, taking Phillips[4] values of Poisson's number for shales at

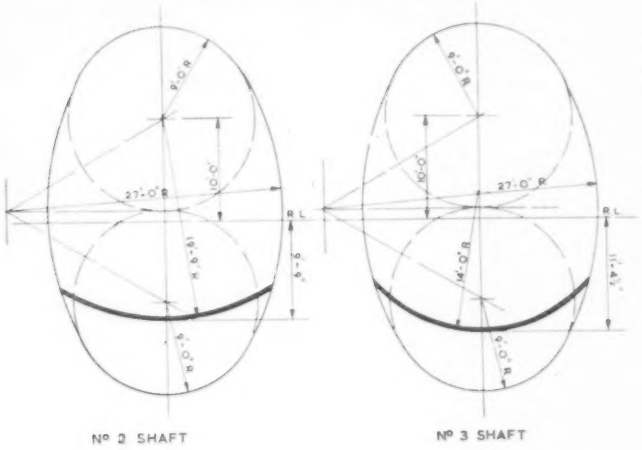

FIG. 3.—SHAPE DIMENSION OF ELLIPTICAL ROADWAYS LEADING FROM No. 2 SHAFT (LEFT) AND No. 3 SHAFT (RIGHT) AT WOLSTANTON COLLIERY.

depth as being 5, then $\frac{a}{b} = 1.5$. For comparison the ratio of the semi-axes in these insets is 1.65.

Having thus obtained the shape dimensions of the proposed ellipse, an agreement is made as to where rail-level coincides with the ellipse. In the design adopted at Wolstanton, this occurs approximately at the horizon of maximum width. The space so left below rail level is far in excess of requirements so the ellipse is terminated prematurely as shown in Fig. 3.

Reinforcement.—Having thus determined the shape dimensions of the inset, reinforcement is designed to accommodate the various stresses. Generally, the reinforcement is designed in two layers (Fig. 4), one layer being at the front and one at the back of the concrete. The front layer takes up tensile stresses in the front of the concrete thickness, and the back layer serves the same purpose where it is situated. To accommodate stress concentrations at abrupt changes of shape, the reinforcement is arranged to form beams, and the whole is tied together by a cruciform arrangement (Fig. 5). Generally, the reinforcement consists of bars of 1-in. dia. round mild steel.

Relating to Aerodynamics.—With large quantities of air-flow through shafts and insets, pressure losses due to sudden changes of direction can be considerable. Associated with changes in direction in fluid flow is the contraction in fluid cross-sectional area known as the "vena contracta." The remaining area between the "vena contracta" section and the walls of the excavation is normally filled with eddies. Pressure losses at direction changes are associated with the friction of these eddies and square-type insets lend themselves to the formation of eddies at the four corners.

Elliptical insets, having no corners as such, greatly reduce the formation of eddies. Abrupt changes of shape, as is common with square work, changing from circular in the shaft to square in the inset, also lead to severe pressure losses. The slow transition from a circular shaft to an elliptical inset lends itself to streamlining since shaft sidewall frictional forces are transmitted to the inset piecemeal as the flow descends or ascends.

The inset of standard dimensions now adopted has a finished mouthing area of approximately 560 sq. ft. with a ventilating area above rail level of 350 sq. ft. (Fig. 3). The quantity of ventilating air required in any one horizon may approach 300,000 cu. ft./min. and this would give an air velocity through the inset of about 860 ft./min.

Relating to Constructional Procedure.—Most other types of inset incorporate a flat or cambered roof having a wide span. One of the most vulnerable points in these types of inset is this wide span

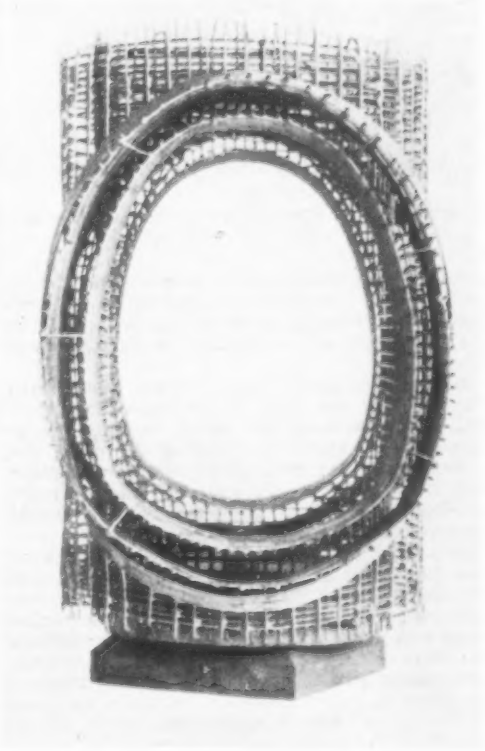

FIG. 4.—END VIEW OF MODEL SHOWING PATTERN OF REINFORCEMENT.

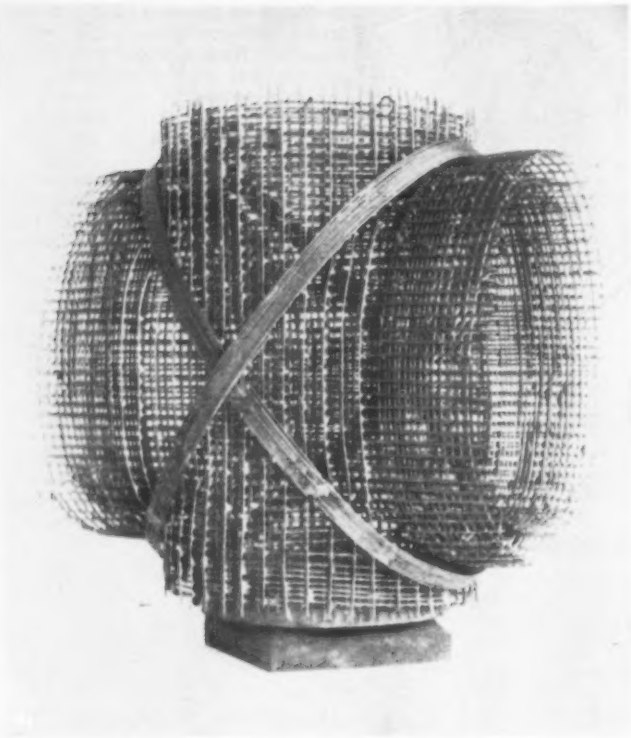

FIG. 5.—MODEL SHOWING THE CRUCIFORM ARRANGEMENT AND THE PATTERN OF REINFORCEMENT.

immediately in the transition from the shaft circle to inset roof. In elliptical-shaped insets this malfeature is missing, since the maximum inset span is only reached as the elliptical profile is followed downwards.

Rectangular-shaped insets and their many variations for 24-ft. dia. shafts would involve the use of girders approaching 30 ft. in length. Large cross-sections would be required to make the girders stable and their resulting weight might make them unmanageable. Furthermore, the large excavations required to take these girders would undoubtedly create many anxious moments.

Elliptically shaped insets, completed in stages, lend themselves to ease of construction coupled with utmost safety. This is primarily because the initial inset drivage resembles a normal mining tunnel with the usual steel arches. The two following stages consist of a short length of normal shaft sinking plus a floor dint in the inset area.

Inset Construction

As already mentioned, these insets are constructed in stages, with each stage being completed before the next stage is commenced. After having achieved some measure of standardization on inset dimensions for a given inset duty, it has been possible to lay down a definite number of stages for its construction.

The cycle of operations for each stage is:—Excavate to the required dimensions and set temporary supports while doing so; brick up inset face where necessary; set and fix reinforcement steel; set shutters and concrete up, and, finally, remove shuttering plates.

When the sinking shaft has reached the level at which it is proposed to commence an inset, the rock wall is excavated in wedge form to make a crib. The shaft is walled-up and the inset constructed below the crib. The purposes of the crib is to prevent shaft walling stresses being transmitted to the inset. The total vertical distance concerned in the standard inset construction is the next 63 ft. below this crib.

Stage 1 of the inset is to construct the portal and commence the cruciform having a finished vertical length of 11 ft. 6 in. Stage 2 concerns the initial drivage into the sides, setting special arches, and forming the inset roof; finished vertical distance 12 ft. 6 in. Stage 3 forms the curved inset side walls to maximum width; finished vertical distance 9 ft. 9 in. Stage 4 completes the inset side walls and forms the floor corners, finished vertical distances 8 ft. 6 in. Stage 5 is the final stage, forming the floor of the inset and bottom supporting crib, having a finished vertical distance of 20 ft. 9 in.

Excavation and Temporary Supports

Excavation for Stage 1 is as normal sinking except that the excavated width is increased where necessary to accommodate a 3-ft. thick shaft wall and additional excavation for the crown of the cruciform.

Stage 2 is the most important stage because it entails the vast transition from driving vertically to driving horizontally. The shaft itself is sunk for a distance of 15 ft. below the previous stage. As the sinking proceeds the side walls are supported by 3-in. by 3-in. link-wire mesh, held in position by 4-ft. and 6-ft. long roof bolts and plate washers. The two sides of the shaft which are not concerned in the inset drivage are further supported by securing the mesh with roof bolts and 7-ft. corrugated steel bars instead of large plate washers. The bars contain holes at approximately 5-ft. 6-in. centres.

On the sides of the shaft where the inset is to be driven, the wire mesh is parted and normal tunnelling methods commence. Temporary support

in the inset tunnels is achieved by setting special three-piece arches, 8-in. by 6-in. section, measuring 15 ft. high by 30 ft. wide. Since the concrete shaft wall immediately above has a minimum thickness of 3 ft., this enables the first two arches to be set with little further excavation. U-shaped brackets cast into, and protruding through the bottom of the Stage 1 concrete enables horsehead girders to be used in the normal manner. Initially, arches are set at 18-in. centres and as strata conditions permit, this interval is increased to 2 ft. 6 in.

The length of inset drivages in these insets has varied from 8 ft. 6 in. in the two upper insets in No. 2 shaft, 15 ft. in the two upper insets in No. 3 shaft, 33 ft. in the lower two insets in No. 2 shaft, to 40 ft. in the lower insets in No. 3 shaft. This method of tunnelling and setting arches ensures utmost safety in that the roof and sides are kept secure.

When the drivages have been completed, the feet of the arches are concreted in to a height of 3 ft. This is to prevent movement when the floor is taken out to make the next stage. In driving inset tunnels a caterpillar-mounted Eimco loader is used to load out the rock into hoppits.

Excavation for Stages 3 and 4 is similar in that the shaft sump is lowered to the required level and then the floor of the inset tunnel is blown up. Again the rock from the drivage area is removed by Eimco loader.

The excavation in Stage 5 resembles normal shaft sinking except that the excavated width varies to accommodate differing shaft walling thickness and the bottom supporting crib. In all of the latter stages, the side walls are supported as a temporary means by roof bolts and wire mesh.

Reinforcement

Concrete is very weak in tension compared with its strength in compression, approximate values for comparison being:—Tensile strength, 600 lb./sq. in.; compressive strength, up to 8,000 lb./sq. in. Should a purely concrete structure be subjected to tensile loading it will fail for obvious reasons. The idea, therefore, of a ferro-concrete structure is to reinforce the tension sides of the structure with steel rods. Mild-steel rods have a tensile strength of approximately 60,000 lb./sq. in. On account, therefore, of the tensile weakness of concrete, stress calculations are made on the assumption that the steel takes all the tensile forces and the concrete all the compressive ones.

When a steel bar is embedded in concrete there is a certain amount of adhesion between the surface of the steel and the surrounding concrete. This is almost entirely due to the roughness of the metal. It has been shown that a plain round bar with an embedded length of 40 times its diameter, subjected to the maximum tensile force it is able to transmit, will have sufficient adhesion to resist being pulled loose.

In practice the embedded end of the bar is often turned up to form a hook. This answers two purposes:—(*i*) The hook gives additional resistance to pulling through the concrete; and (*ii*) the embedded length may be reduced to give the same resistance.

The reinforcement used in these insets is predominately 1-in. dia. round mild steel. The steel bars are cut to length and bent to their various shapes, as dictated by the bar-bending schedules at the colliery. Two men, who were completely new to the job, are fully engaged in this work and are now turning out a satisfactory product.

In previous insets, each bar was taken down the shaft and individually placed in position. Now, however, sections or panels of reinforcement are assembled on the surface and spotwelded together. Widths of panels are governed by the openings in the scaffold platforms, while the length is governed by both ease in handling and convenience in erection. Each bar, when it is bent, has its identification number painted on it to correspond with the bar-bending schedule. When the panels are prefabricated, they are further marked with a splash of distinctive coloured paint.

Underground, the panels are easily erected in their proper sequence by reference to the coloured paint. Spotwelding the steel into panels has reduced by one half the time required for fixing the steel in any given stage.

When the excavation required for any given stage has been completed, the shaft sump and inset floors are smoothed off at the correct level for the bottom of that particular stage. At a height of 2 ft. 6 in. above floor level a series of holes is drilled across each inset face. Round mild-steel plugs, 1¼ in. dia. and 6 ft. long, are inserted in these holes and they support a 10-in. by 8-in. steel joist. Using this girder as a base, an 18-in. brick wall is built up the inset face.

This wall serves two purposes, *viz.*:—(*i*) When the inset is completed and sinking recommences, the wall prevents pieces of rock falling off the inset face and cascading down the shaft; and (*ii*) thirling tunnels can be driven right up to the back side of the wall before actual connection is made. When the face is bricked-up, the reinforcement steel for that stage is set and fixed. Panels of reinforcement are laced together by through bars. All ties are made with 16 s.w.g. iron wire to prevent displacement during concreting and to ensure the required thickness of concrete covers the bars. The reinforcement is set in two layers, one layer situated 3 in. behind the front face of the concrete and the other layer at the back of the excavation.

When the shuttering is set in position, the bottom 2 ft. 6 in. is filled with sand and waste gravel and not concrete. Concrete is placed on top of this back-fill. When the shutters are stripped off after concreting, this sand and gravel are removed. Approximately 2 ft. 6 in. of reinforcement steel thus protrudes through the base of the concrete walling. The reinforcement steel for the next stage can then be overlapped and secured to the steel in the previous stage. Continuing in this way through each stage, the whole of the reinforcement steel is tied and locked together throughout the inset.

Normal 24-ft. dia. tubbing segments are used through the shaft portion of the inset. For the inset tunnels, wooden shuttering was made up by the contractors' joiners on the site. However, now that the insets are somewhat standardized Acrow steel shutters are used for straight and uniform portions. Wood is now only used to make up the transition pieces in moving from horizontal elliptical drivage to vertical cylindrical shaft. Steel shutters have the advantage in that they can be re-used on other insets. Wooden shutters are often damaged beyond recognition on removal.

Concrete is mixed on the surface in 1-cu. yd. Stothert & Pitt mixers. All aggregates for mixing are weighed at a batching plant before being tipped into the mixer-skip. The general mix used in this work has a slump of up to 6 in. and consists of 1,035 lb. of ¾-in. clean gravel, 630 lb. of ⅜-in. nominal gravel, 750 lb. of washed sand, 560 lb. of Sulfacrete cement and water to mix.

After mixing, the concrete is poured into a trough and passed down the shaft through a 6-in. dia. pipeline. At the bottom of the pipeline there is a header-box or dash-pot to check the rate of fall of the concrete. Dash-pots are of many designs, but most employ a system whereby the concrete leaves this box by two branch tubes, one on each side. Flexible hoses of 6-in. dia. lead from the branch tubes to direct the concrete behind the shuttering. During concreting operations, compressed-air poker-type vibrators are used to ensure compaction.

When this stage of the work is nearing completion it is sometimes difficult to force the concrete to the back of the inset using flexible hoses alone. For this final piece of work a concrete placer is taken down the shaft. The flexible hoses then lead into the top of the placer and final cavities are filled under pressure. The minimum thickness of concrete in the inset elliptical walls is 3 ft. 6 in. and in the shaft walls 3 ft.

The time of mixing concrete in these large mixers can have definite effects on the quality of the concrete. The ingredients in a 1-cu. yd. mixer should be mixed for at least 2 min. Allowing time for loading the mixer and discharging when mixed, this gives a throughput of approximately 20 cu. yd./hr. On the night shift of October 16, 1959, 122 cu. yd. were mixed, poured into the pipeline, and placed underground in the floor of the 8,300-ft. inset.

Setting time varies with thickness of concrete and in this case it is usually 10-12 hr. Shaft tubbing is removed first and the joint between one stage and the last is cleaned down. Finally, all shutters are removed from the inset. Immediately after the shutters have been removed, the concrete walls are thoroughly drenched with water.

The strength of concrete increases with time if curing conditions are favourable. Also, the main factor affecting shrinkage is the quantity of water used during mixing. If too much water is used it will be lost in evaporation. If evaporation is rapid, then hairline cracks may appear. A summary of the complete constructional work for the 8,650, 8,300, and 7,500-ft. insets in No. 3 shaft is given in Table 2 and an analysis of the materials used in Table 3.

TABLE 2.—*Analysis of Constructional Work for the 8,650, 8,300, and 7,500-ft. Insets in No. 3 Shaft.*

Item.	No. 3 Shaft 8,650-ft. inset, manshifts.	No. 3 Shaft 8,300-ft. inset, manshifts.	No. 3 Shaft 7,500-ft. inset, manshifts.
Excavating ground and setting temporary supports	840	843	985
Setting reinforcement steel, etc.	434	281	556
Setting shutters, etc.	287	255	298
Concreting	307	266	473
Stripping of shutters and tubbing, etc.	267	203	193
Total manshifts worked	2,135	1,848	2,505
Total shifts worked	150	134	178
Total days worked	54	46	63
Rate of completion per working day (ft.)	1.17	1.37	1.04

TABLE 3.—*Analysis of the Materials Used in the 8,650, 8,300, and 7,500-ft. Insets in No. 3 Shaft.*

Item.	No. 3 Shaft 8,650-ft. inset.	No. 3 Shaft 8,300-ft. inset.	No. 3 Shaft 7,500-ft. inset.
	Tons.	Tons.	Tons.
Cement	348	318	482
Sand	656	554	740
¾-in. gravel	646	651	868
⅜-in. gravel	509	583	604
Reinforcement	54¼ (8.6 miles)	54¼ (8.6 miles)	68 (10.8 miles)

To avoid the use of excessive water, mixers are fitted with a water tank and gauge for measuring quantity in gallons. A device for altering the discharge setting is provided so that the quantity is only altered by the man in charge.

Slump tests are made every three to four mixes as a practical means of maintaining a certain degree of uniformity in the concrete. This test indicates any material change in water content or the proportions of the mix. The compressive test, using 6-in. cubes, is employed to determine the absolute quality of the concrete. Samples are usually taken as the concrete is being poured from the mixer, but some have been taken from the walling in the shaft as the concrete is being placed.

When making cubes, a sample is taken from three consecutive mixings to form a batch. One batch is taken for approximately every 50 cu. yd. of concrete mixed. Batches of cubes are tested when either seven or 28 days old. The seven-day compressive strength is approximately 60 per cent. of the 28-day result. The seven-day result is used to give a relatively quick assessment of strength. The 28-day result, which is taken to be the ultimate strength, serves as confirmation. Table 4 gives an analysis of 28-day compression tests on concrete cubes.

Conclusions

This method of constructing large insets is com-

TABLE 4.—*Analysis of 28-day Compression Tests on Concrete Cubes Taken for the 8,650-ft. Inset in No. 3 Shaft.*

Date.	Individual cube strength, lb./sq. in.	Mean strength of batch, lb./sq. in.	Cumulative mean strength, lb./sq. in.	Batch standard error, lb./sq. in.	Cumulative standard error, lb./sq. in.	Batch variation, per cent.	Cumulative variation, per cent.
12.5.59 ..	6,600 6,350 5,850	6,270	6,270	±312	± 312	4.9	4.9
5.6.59 ..	6,100 6,900 6,850	6,620	6,440	±366	± 378	5.5	5.9
6.6.59 ..	8,500 8,600 8,500	8,530	7,140	± 48	±1,034	0.6	14.5
14.6.59 ..	5,950 5,900 6,500	6,120	6,880	±272	±1,008	4.4	14.7
15.6.59 ..	6,400 6,800 5,700	6,300	6,770	±457	± 954	7.25	14.1
24.6.59 ..	5,700 6,500	6,100	6,690	±400	±931	6.6	13.9
30.6.59 ..	5,200 6,800 5,400	5,800	6,550	±712	± 956	12.3	14.6
3.7.59 ..	5,900 6,650 6,200	6,250	6,250	±268	± 904	4.3	13.9

pletely safe in that the roof and sides can always be supported. Inset drivage using normal steel arches is a relatively easy operation. Most sinkers have spent some time in coal pits and are familiar with rippings, tunnels, and the setting of arches. Large perilous excavations associated with square work and attendant large steel joists are avolded.

The method of sand filling the bottom of each stage ensures a complete tie in reinforcement steel and making the inset as the sinking advances also ensures that the inset is tied into the shaft. The degree of quality control of concrete used in the insets so far constructed has been good. Reference to, and comparison with, Table 5 by Sparkes[5, 6] will confirm this conclusion. In the 8,650-ft. inset (No. 3 shaft) the coefficient of variation was 13.9 per cent. and reference to Table 5 will show this to be satisfactory.

This method of construction lends itself to the speedy completion of insets. The last three insets have been completed in the times indicated in Table 6. The reduction in constructional time in the No. 3 shaft inset is due mainly to the sinking personnel becoming familiar with what is requ.red.

The 7,500-ft. inset in No. 3 shaft was completed

TABLE 5.—*Comparative Standards for the Quality Control of Concrete.*

Degree of control.	Coefficient of variation.	Standard deviation for mean crushing strength of 5,000 lb./sq. in.
	Per cent.	lb./sq. in.
Well-controlled laboratory tests ..	5	250
Excellent—approaching laboratory precision	10	500
Excellent	12	600
Good	15	750
Fair	18	900
Fair-minus	20	1,000
Bad	+25	+1,250

TABLE 6.—*Completion Times for the Construction of Insets at Wolstanton Colliery.*

Shaft.	Inset.	Time.	Remarks.
		Days.	
No. 2	8,300-ft.	49	Smaller type
No. 3	8,652-ft.	54	Larger type
No. 3	8,300-ft.	46	Larger type

in a time of nine weeks. This time included the construction of the east side mouthing to a depth of 30 ft., the west side mouthing to a depth of 24 ft., and also the construction of eight reinforced concrete foundation blocks on the floor of the inset to support the envisaged decking equipment.

The author would like to thank Mr. H. J. Widdowson, Area general manager, North Staffs Area, West Midlands Divisional Coal Board, for permission to read and publish this paper. Special thanks are due to Mr. T. Walker, president, North Staffs Branch, NACM, for help and guidance in the preparation of this paper. Mr. W. Whitfield, colliery surveyor, and his staff are thanked for their assistance in the preparation of drawings and Mr. J. Knapper for making the models. A word of appreciation is accorded to the Cementation Company, Limited, which is completing the contract. Any opinions expressed are those of the author and not necessarily those of the NCB.

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Forthcoming Events

FEBRUARY 27

Institution of Plant Engineers (West and East Yorkshire Branch):—Meeting at the Houldsworth School of Applied Science, Leeds University, at 7.30 p.m. "Fuel—Economy and Productivity," by K. Higginson (NIFES).

Institution of Production Engineers (Derby Section):—Meeting at the St. James's Restaurant, St. James's Street, Derby, at 7 p.m. "Numerical Analogue Control of Machine Tools," by O. S. Puckle.

Institution of Production Engineers (Manchester Section):—Meeting at Reynolds Hall, Manchester College of Science and Technology, at 7.15 p.m. "Business Aids to Production," by J. Gelley.

Institution of Electrical Engineers (North-Eastern Centre):—Meeting at Neville Hall, Newcastle-upon-Tyne, at 6.30 p.m. "A General Theory of Depreciation of Engineering Plant," by D. Rudd.

FEBRUARY 28

Combustion Engineering Association (North Western Region):—Meeting at the Engineers' Club, 17, Albert Square, Manchester 2, at 7.15 p.m. "Fuels for Modern Engines," by A. F. A. Nida (Shell-Mex & B.P., Limited).

Institution of Electrical Engineers (South Midland Centre):—Meeting at the Town Hall, Birmingham, at 7 p.m. Faraday Lecture: "Transistors and All That," by L. J. Davies.

Society of Chemical Industry (Corrosion Group):—Cathodic Protection Panel meeting at 14, Belgrave Square, London, S.W.1, at 6 p.m. "External Protection of Floating Craft," by M. G. Duff and P. Clark.

Institution of Engineers and Shipbuilders in Scotland:—Meeting at 39, Elmbank Crescent, Glasgow, C.2, at 6.30 p.m. "Results of Some Systematic Stability Calculations," by Prof. C. W. Prohaska.

Institution of Plant Engineers (South Wales Branch):—Meeting at the South Wales Institute of Engineers, Park Place, Cardiff, at 7.30 p.m. "Industrial Lighting," by R. S. Hazell.

MARCH 1

North Western Fuel Luncheon Club:—Meeting at the Engineers' Club, 17, Albert Square, Manchester 2. Address by Dr. G. Armstrong, Imperial Chemical Industries, Limited.

Combustion Engineering Association:—Meeting at the Grand Hotel, Charing Cross, Glasgow, at 10 a.m. "The Automatic Boilerhouse"; addresses on "Research by the BCURA," "Instrumentation and Control," and "The Problems of the User."

Society of Instrument Technology (South Yorkshire Section):—Meeting at the Metropole Hotel, Leeds, at 7 p.m. "High-speed Instruments for Combustion Research," by A. E. Pengelly.

Institution of Production Engineers (Brighton Group):—Meeting at the Old Ship Hotel, Castle Square, Brighton, at 7 p.m. "The Economics of Material Handling," by A. G. Hayek.

Institution of Production Engineers (Cornwall Section):—Meeting at Cornwall Technical College, Trevenson, Pool, Redruth, at 7.15 p.m. "Recent Developments in the Soviet Union," by Dr. D. F. Galloway.

Institution of Production Engineers (Western Section):—Meeting at the Grand Hotel, Bristol. "Machine Tools," by G. W. Wright.

MARCH 2

Midland Institute of Mining Engineers:—Meeting at the Royal Victoria Hotel, Sheffield. "The Economics of the Salvaging of Materials," by F. Fairclough and M. Young.

Institution of Plant Engineers (North East Branch):—Meeting at the Three Tuns Hotel, Durham, at 7 p.m. "Plant Engineering in a Plastics Factory," by A. E. Swallow.

Institution of Mechanical Engineers (East Midlands Branch):—Meeting at the College of Technology, Chesterfield, at 7.15 p.m. "Mechanical Handling Equipment and its Applications," by F. T. Dean.

MARCH 3

Institution of Engineers and Shipbuilders in Scotland:—Joint meeting with the Aberdeen Mechanical Society at Robert Gordon's Technical College, Aberdeen, at 7.45 p.m. "Developments in Marine Steam Turbine Design," by Dr. T. W. F. Brown.

MARCH 6

Institute of British Foundrymen (Sheffield Branch):—Meeting at the Technical College, Pond Street, Sheffield, at 7 p.m. "Running, Gating, and Feeding of Blackheart Malleable," by W. J. Campbell.

Institution of Plant Engineers (Sheffield and District Branch):—Meeting at the Station Hotel, Chesterfield, at 7.30 p.m. "Industrial Diseases and Factory Hygiene," by Dr. Hartley (Samuel Fox & Company, Limited).

MARCH 7

Institution of Chemical Engineers:—Meeting at the Geological Society, Burlington House, London, W.1, at 4 p.m. Papers on "Fluidization" from A.E.R.E., Harwell.

Midland Counties Institution of Engineers:—Invitation to members to attend a meeting of the Midland Counties Branch of the Institution of Structural Engineers at the East Midlands Electricity Board Showrooms, Derby, at 6.15 p.m. "Mining Subsidence, Design Problems and Remedial Measures," by K. Wardell.

Institution of Plant Engineers (London Branch):—Meeting at the Royal Society of Arts, John Adam Street, Adelphi, London, W.C.2, at 7 p.m. "Maintenance of Heat Exchangers," by H. B. Merriman.

Institution of Plant Engineers (Peterborough Branch):—Meeting at the White Lion Hotel, Church Street, Peterborough, at 7.30 p.m. "Some Medium-sized Boilerhouses," by G. A. Rooley.

MARCH 8

Royal Society of Arts:—Meeting at John Adam Street, Adelphi, London, W.C.2, at 6 p.m. "Technical Developments in the Steel Industry," by Sir Andrew McCance, FRS, chairman and managing director of Colvilles, Limited. Applications for tickets to the secretary of the RSA.

National Association of Colliery Managers

MARCH 6

South Midland Branch:—Meeting at Ashby Rescue Station at 4 p.m. "The Instrumentation Work of the Mining Research Establishment," by A. E. Bennett.

MARCH 8

Scottish Branch:—Meeting at the Royal College of Science and Technology, Glasgow, at 5.15 p.m. "Narrow Work—Past, Present, and Future," by R. B. Dunn

MARCH 14

Yorkshire Branch:—Meeting at the Miners' Welfare Hall, Brodsworth, at 3 p.m. "The Billingham Anhydrite Mine, with Special Reference to Safety," by R. E. Collins.

MARCH 17

North of England Branch:—Annual informal dinner (men only) at the Old Assembly Rooms, Newcastle-upon-Tyne 1.

MARCH 20

Midland Branch:—Meeting at the Denman's Head Hotel, Sutton-in-Ashfield, at 6.30 p.m. Paper by W. E. Vance, ventilation engineer, No. 3 Area.

MARCH 22

Lancashire Branch:—Meeting at 40, Portland Street, Manchester. Discussion on "Methods of Roof Support in View of Impending New Regulations."

North of England Branch:—Meeting at 6.45 p.m.

MARCH 24

Yorkshire Branch:—Dinner and dance at the Danum Hotel, Doncaster.

MARCH 31

Kent Branch:—Meeting at the Swan Hotel, Deal, at 7.15 p.m. "The Reconstruction of Snowdown Colliery," by J. L. Huxley, agent/manager, Snowdown Colliery.

THE 33rd International Congress of Industrial Chemistry will be held in France from September 28 to October 8. The congress will take place in Bordeaux from October 1 to 8 and will be preceded by three days connected with chemical engineering at Toulouse. Among the 23 sections covered by the congress will be metallurgy, corrosion, solid fuels, and rubber.

BISRA STEELMAKING CONFERENCE

DISCUSSION ON

The Physical Chemistry of **Oxygen Steelmaking**

Below are published the opening contributions to the discussion that followed the presentation of two papers at the 55th Steelmaking Conference of the British Iron and Steel Research Association, held at Harrogate last October. The papers were "The Practical Chemistry of Oxygen Steelmaking Process," by Mr. R. A. Hacking (Richard Thomas & Baldwins, Limited) and "The Theoretical Basis of Oxygen Steelmaking," by Dr. J. Pearson (BISRA). The papers were published in our November 18 (p. 1107) and December 30 (p. 1407) issues, respectively. The contributors to the discussion reported below are Dr. A. J. Kesterton, superintendent, steel plants, Steel Company of Wales, Limited, and Mr. H. F. Padbury, assistant works manager (coke, iron, and steel), Richard Thomas & Baldwins, Limited, Spencer Works, Llanwern.

DR. A. J. KESTERTON:

AFTER expressing his appreciation of the able manner in which the speakers had presented the difficult subject of the chemistry of steelmaking, Dr. Kesterton dealt principally with experience in the oxygen steam converter practice at the VLN steel plant of the Steel Company of Wales, the results of which were of interest in so far as they illustrated the influence of factors controlling the rates of the steelmaking reactions.

The general operating data was as shown in Table 1, in which was included for comparison the analysis of a typical OH process slag for the equivalent extra deep-drawing low-carbon steel by that process. Points of interest here were the slightly higher iron content and much lower P_2O_5 content of the OH slag as, of course, the OH furnaces worked on a much lower phosphorus burden.

It will be appreciated that steel of the analysis indicated is excellent for sheet steel applications, particularly for severe deep drawing.

Nitrogen

The nitrogen is at the exceptionally low level of 0.0011 per cent. Figures down to 0.0008 per cent. were frequently achieved. By comparison, the nearest approach in the top-blown processes was about 0.002 per cent., while open-hearth steel ranged from 0.0035 to 0.005 per cent. Thus, it was not surprising that the steel represented in Table 1 was superior to OH steel for extra deep-stamping purposes.

The low nitrogen results principally from the fact that the blast has an extremely low partial pressure of nitrogen. At the most there was 0.5 per cent. N_2 in the oxygen, and none in the steam. Also, compared with the top-blown oxygen processes, there was more flushing gas passing through the metal. In addition to the CO produced by the oxidation of carbon, which was common to both processes, the steam effectively doubled the volume of flushing gas.

Further, in the top-blowing processes at the reaction zone where the oxygen jet struck the bath

TABLE 1.—*Steel Company of Wales, Limited, VLN Steel Plant; General Operating Analyses.*

	C, per cent.	Si, per cent.	S, per cent.	P, per cent.	Mn, per cent.	N_2, per cent.	Cu, per cent.	Ni, per cent.	Sn, per cent.	
Hot metal analysis ..	3.8	0.35	0.024	1.8	0.8	—	—	—	—	
Steel analysis	0.05	—	0.022	0.025	0.30	0.0011	0.03	0.05	0.01	
	SiO_2, per cent.	FeO, per cent.	Fe_2O_3, per cent.	Al_2O_3, per cent.	Mno, per cent.	CaO, per cent.	MgO, per cent.	S, per cent.	P_2O_5, per cent.	Total Fe, per cent.
1st slag analysis ..	6.0	6.0	7.7	2.5	4.0	48.0	3.4	0.068	21.0	10.0
Tap slag analysis ..	3.7	1.0	12.0	2.0	3.3	45.0	3.4	0.065	12.0	23.0
OH slag analysis (for comparison)	7.4	20.0	11.0	2.5	4.3	42.0	8.3	0.17	4.3	24.0

Other operating data:—Oxygen gas, 99.5 per cent. oxygen; oxygen consumption, 2,000 cu. ft./ton of steel; blastbox pressure, 35/40 lb./sq. in.; blowing times: 1st blow, 10/12 min., 2nd blow, 30/60 sec.

there would be a very high local temperature, such that some pick-up of nitrogen was probable, even from the small quantity present in the oxygen. On the other hand, at the equivalent point of contact in the oxygen/steam process, the steam lowers the temperature of the reaction. As was well known, low nitrogen was a very valuable feature of steel sheet required for severe deep-drawing processes.

Carbon

The data relevant to the removal of carbon were as given in Table 2, comparative figures for the OH process at tap also being included.

TABLE 2.—*Steel Company of Wales, Limited, VLN Steel Plant: Degree of Oxidation and Carbon Removal.*

Sample.	Per cent. C.	Per cent. total Fe in slag.	Basicity ratio.*
After 1st blow ..	0.024	10.0	2.5
After 2nd blow ..	0.019	23.0	4.0
OH—At tap (oxygen lance)	0.043	24.0	4.1

* Basicity ratio = $CaO/SiO_2 + 0.634\ P_2O_5$.

The salient feature was the very low-carbon level of 0.019 per cent. after the second blow, *i.e.*, at tapping. This was associated with a state of oxidation defined by a total slag Fe of 23.0 per cent., and basicity ratio of 4.0. In the open-hearth furnace, substantially the same state of oxidation, *i.e.*, slag Fe 24 per cent. and basicity ratio 4.1, results in the much higher bath carbon of 0.043 per cent. These results confirm the account given by Dr. Pearson. The reasons why, in bottom-blown processes, lower states of oxidation are produced at equivalent C levels are as follow.

In the first place, in bottom-blowing processes, the partial pressure of the CO formed from oxidation of the carbon, was less than 1 atm., due to the diluent effect of steam, or nitrogen. In consequence, the equilibrium constant [C] × [O] was less than 0.0025. For the straight air-blown basic-Bessemer process, for example, Dr. Pearson's Fig. 3 gave an equilibrium constant of about 0.0008, which meant, therefore, that for a given state of oxidation, much lower levels of carbon were possible in bottom-blown converters using diluent gases compared with top-blown oxygen converters or with the open-hearth furnace.

Secondly, again compared with the top-blown oxygen or open-hearth processes, there was, particularly at low-carbon levels, much greater bath agitation present in the bottom-blown converters. This would tend to ensure that metal and slag were closer to equilibrium, *i.e.*, that a given carbon level was associated with the lowest possible state of oxidation.

Again, in the bottom-blown processes, the partial pressure of the CO fell to low levels towards the end of the blow, since the rate of carbon elimination tailed off, while the volume of diluent gas passing usually remains constant. Hence, the value of the equilibrium constant [C] × [O] continued to fall. This was the reason, Dr. Kesterton thought, why, on Dr. Pearson's curve for the equilibrium constant at 0.4 atm., some points at low-carbon levels fell below the line.

For production of the lowest carbon steels, the bottom-blown processes were therefore more efficient. Again, this was an advantage of very great importance in the production of steel sheet for severe deep drawing.

Sulphur

Dr. Pearson had not devoted much attention to the theoretical basis of the elimination of sulphur in oxygen steelmaking. So far as conditions at the Abbey Works were concerned, the consistently low-sulphur content of the hot metal meant that sulphur elimination was not a problem. Table 3 was typical of the very satisfactory results being obtained. However, lower and lower sulphur contents in sheet steel were being sought and the guidance of the physical chemist on the production of ultra low-sulphur steel in the converter processes would be welcomed.

TABLE 3.—*Steel Company of Wales, Limited, VLN Steel Plant: Sulphur Removal.*

Sulphur content of hot metal, + 0.024 per cent.
Sulphur content of lime, + 0.020 per cent.

Sample.	Per cent. S in steel.	Per cent. S in slag.	Ratio (S)/[S]	Basicity ratio.
After 1st blow	0.025	0.068	2.7	2.5
After 2nd blow	0.023	0.065	2.8	4.0
Ladle	0.022	—	—	—

It was interesting to consider the movement of sulphur in the oxygen-steam process at Abbey. After the first blow the S was 0.025 per cent. and after the second, *i.e.*, at tapping, 0.023 per cent. A significant feature was that the sulphur content of the slag was 0.065 per cent., and the ratio (S)/[S] was 2.8 with a basicity ratio of 4.0.

It would appear that the slag analysis from the point of view of basicity and state of oxidation is compatible with higher (S)/[S] ratios. Clearly the kinetics of the chemical reactions controlling the transfer of sulphur from metal to slag must be an important factor.

In the bottom-blown processes, as Dr. Pearson had demonstrated, the formation of a fluid basic slag did not take place until after the transition point, *i.e.*, after nearly all the carbon had been eliminated and, in fact, only during the late stages of phosphorus elimination. Since the first blow in the oxygen-steam process was short, lasting 10 to 12 min., of which some 2½ to 3 min. represented the dephosphorization period, the time during which a fluid basic slag existed was probably about 2 min. The second blow, during which the slag was fluid and at the highest level of basicity, lasted 30 to 60 sec.

From these times it was apparent that the chemical reactions controlling sulphur elimination would need to be very rapid to be effective in eliminating sulphur, and that the intensity of the

physical mixing between slag and metal, therefore, was probably an important factor. At the specific time, in the oxygen/steam process, only the steam flow was agitating the bath, since there was then virtually no formation of CO.

However, apart from the actual volume of gas agitating the slag-metal interface, it is thought that the extent of the turbulence caused by the currents set up in the bath is also important. Improvement in sulphur elimination should be possible by a study of such physical factors as tuyere size and distribution and converter shape, with a view to increasing the turbulent mixing of slag and metal.

Phosphorus

The performance of the oxygen/steam process with respect to phosphorus was as in Table 4.

TABLE 4.—*Steel Company of Wales, Limited, VLN Steel Plant: Phosphorus Removal.*

Sample.	Per cent. P.	Per cent. Tot. Fe in slag.	Per cent. P_2O_5	Basicity ratio.	Per cent. P (E. Steel).*
After 1st blow	0.07	10.0	21.0	2.5	—
After 2nd blow	0.026	23.0	12.0	4.0	0.032
Ladle	0.025	—	—	—	0.019

Temperatures (1st and 2nd blow), 1,590/1,620 deg. C.
* E. Steel: Enamelling steel—no additions to steel ladle.

Briefly, the operating practice for phosphorus control is as follows. The quantity of charged lime is dependent on the phosphorus and silicon content of the hot metal, and is that required to combine with the silicon and phosphorus to form $2CaO.SiO_2$ and $3CaO.P_2O_5$, respectively, plus an excess of 70 per cent. It is equal to about 12 per cent. of the hot-metal weight.

It was aimed to turn down the converter for slag-off with 0.05 to 0.08 per cent. P in the bath, when the slag should analyse about 12 per cent. Fe, and 19 to 21 per cent. P_2O_5. At this point as much slag as possible was removed, the temperature measured, and a steel sample analysed for P, Mn, and S in 3 to 4 min. by the quantometer.

Provided that the Mn content of the metal was reasonably constant, it had been found that the ratio of P to Mn in the steel sample after the first blow gave a clear indication of the slag basicity, and that the Mn content alone indicated the state of oxidation. For example, the slag basicity was satisfactory if P and Mn corresponded as in Table 5, when working a hot metal containing 0.7 to 0.8 per cent. Mn:—

TABLE 5.

Manganese.	Phosphorus.
0.16 per cent.	0.08 per cent.
0.14 per cent.	0.06 per cent.
0.12 per cent.	0.045 per cent.
0.10 per cent.	0.035 per cent.

The lower manganese levels indicated higher states of oxidation. If the P was higher at a given Mn than in the above table, then the basicity was below normal, and necessitated a lime addition before the second blow and modification of the charge lime for the next heat.

The principal aim of the second blow was to lower the P to less than 0.027 per cent. This was achieved with a tapping slag analysis of 22 to 28 per cent. Fe and 10 to 12 per cent. P_2O_5, and a steel temperature in the range 1,595 to 1,620 deg. C.

Generally, therefore, the length of the second blow was based upon the time required to raise the slag Fe to the desired level, using the Mn after first blow as the guide to the state of oxidation at the start of the second blow. Blowing times were as in Table 6.

TABLE 6.—*Duration of Second Blow.*

First blow Mn.	Blow (sec.).
Per cent.	
0.10	15
0.12	30
0.14	45
0.16	60
0.18	75

Superimposed on these blowing times were adjustments for additions of fine lime to improve basicity, or as a coolant, or ferro-silicon for increasing temperature.

The above practice represented a close metallurgical control over the process, and the achievement of the desired phosphorus specifications was of a high order of accuracy.

However, as he had suggested in regard to sulphur elimination, an increase in the amount of turbulence and mixing in the bath by modifications to converter shape, tuyere size and distribution, might result in still greater dephosphorization efficiency.

In support of this suggestion the addition of limestone between blows, which created turbulence by calcination (it also had a cooling effect), had been found beneficial.

Furthermore, when enamelling steels were produced, to which no addition of ferro-manganese was made, *i.e.*, there was no deoxidation of the steel, the phosphorus content decreased considerably between the tapping ladle samples, *i.e.*, from 0.032 to 0.019 per cent. It was assumed that the slag and metal were violently mixed during pouring into the ladle, and some of the dephosphorizing potential of the slag was utilized. It was probable that the drop in temperature from converter to ladle was responsible for part of the reduction in phosphorus. However, the additional mixing should also contribute to the dephosphorization.

To sum up, the oxygen/steam process was both in theory and practice especially favourable to the production of steels of low carbon and nitrogen contents, this being the key to its eminence as a producer of extra deep-drawing quality steel. While in practice it removed sulphur and phosphorus efficiently, theoretical considerations suggested that these two elements might be reduced to even lower values and here then was where research should be directed.

MR. H. F. PADBURY:

MR. PADBURY said he was happy to find that the two speakers had reduced the physical chemistry of steelmaking to such simple terms. He proposed to look at the practical results obtained in the blowing processes with reference to dephosphorization, to show how closely it confirmed the theoretical explanations that had been given.

The steelmaker was interested in handling the process to get the desired analysis with maximum yield, and in the making of low-carbon, low-phosphorus steel, the yield was strongly affected by certain factors which the speakers had mentioned. Over and above the physical-chemical reasons, some of the yield problems arose from the sheer speed of conversion of the pneumatic processes and the consequent greater difficulty of control compared with the open-hearth process, but doubtless, as more oxygen blowing was carried out in the open-hearth process, these problems would become of significance there also.

He recognized that it was not strictly correct to talk in the same breath of oxygen content of the bath and iron content of slag, although Dr. Pearson had indicated that the metal and slag were near to equilibrium at the end of the blowing operation. Industrially, it was the practice to use the iron content of the slag as the guide to state of oxidation.

A recent paper by Metz, Decker, and Nepper (Iron and Steel Institute Translation Series 1576, Fig. 11), showed a weak relationship between total iron in the slag and the oxygen content of the steel at the end of refining.

In the Thomas process, the state of oxidation of metal and slag appeared to be controlled by the equilibrium between [P] and [O] at the steelmaking temperature. In practice, the iron content of the slag was low, say, 11 per cent. max., to the point where the phosphorus content was 0.05 per cent., and then the iron in the slag increased rapidly and the phosphorus decreased and below 0.025 per cent. P the increase of iron in the slag was great. The carbon content of the bath changed little at the end of the blow, but the oxygen in metal increased rapidly as the phosphorus content of the metal was reduced from 0.05 per cent. to 0.02 per cent.

In top-blowing processes where it was possible to dephosphorize with the retention of carbon, it would appear when working a two-slag process, that the ultimate state of oxidation of slag and metal must be controlled by the equilibrium between [C] and [O]. If one considered the equilibrium curve at 1,600 deg. C. (Vacher and Hamilton), it was shown that with 0.04 per cent. C residual, the [O] was 0.06 per cent., whereas at 0.02 per cent. C, the [O] was 0.1 per cent.

Practical results tended to confirm that the oxidation state of the top-blowing process was determined by the carbon content of the steel. It was possible to blow down to less than 0.02 per cent. C, with a resulting iron content in the slag of more than 30 per cent., whereas stopping the charge with 0.035/0.04 per cent. C would produce 20 to 25 per cent. iron in the slag.

Clearly, the steelmakers' problem was to find a control system which would enable him to stop the operation with certainty at 0.04 per cent.

Dr. Pearson showed "that for phosphorus removal one does not need a highly basic slag so long as it is sufficiently oxidizing." This statement had been completely confirmed in the LD/AC converter process. Early experience, when the amount of powdered lime in the first phase was insufficient, showed a turn-down condition as follows:—

Metal: 1.0 per cent. C, 0.20 per cent. P;
Slag: SiO_2 + P_2O_5, more than 20 per cent.;
CaO, 30 per cent.;
Fe, 18 to 20 per cent.

Now, with controlled additions of lime, the first turn-down sample was:—

Metal: 0.70 per cent. C, 0.15 per cent. P;
Slag: SiO_2 + P_2O_5, more than 26 per cent.;
CaO, 47 per cent.;
Fe, 9 per cent.

At the same time, it must be remembered that there was no advantage in adding excess lime, that is, more than the stoichiometric requirement for the first slag, as excess lime will increase the volume of slag and will cause undue iron loss for this reason.

For these considerations, the temperature of the metal and slag at the end of the process had a big bearing on the state of oxidation ruling.

As far as he was concerned the effect of temperature had been brought home many years ago, when his company first introduced the use of the immersion pyrometer in the bottom-blown converter process, aiming for a final turn-down temperature of 1,580 ± 10 deg. C. The previous practice without temperature measurement, gave, he would estimate, 1,600 deg. C., with greater scatter.

The primary reason for introducing temperature control was to reduce nitrogen content in the steel, but, incidentally, it was found that the average phosphorus was reduced from 0.035 to 0.024 per cent.

Steelmakers producing low-carbon, low-phosphorus steels by the blowing processes had special problems in carrying out the operation with the maximum economy of yield, and any guidance from physical chemists on new lines of approach could be of great interest.

PRELIMINARY FIGURES show that iron-ore output in Spain in 1960 increased to 5,167,000 m. tons, a rise of 12½ per cent. over the 4,609,000 tons of 1959.

INDIA AND RUMANIA have signed an agreement under which India will supply iron ore to Rumania in return for petroleum products, drilling equipment, and industrial plant. It is understood that India will supply 200,000 tons of iron ore this year and that in 1966, subject to port facilities being developed, 1,000,000 tons will be despatched. In any event, the 1966 figure is expected to be not less than 600,000 tons.

Automatic Gauge and Tension Control

ON COLD REDUCTION MILLS

New System Devised at Ebbw Vale

INSTRUCTIONS to improve the control of gauge on the five-stand cold reduction mill at the Ebbw Vale Works of Richard Thomas & Baldwins, Limited, were issued over a year ago. Since then the electrical engineering department has devised a system of automatic gauge and tension control which means the production of a more consistent tinplate product and a reduction in off-gauge material. The system has now been in operation for several months and has been accepted as a reliable aid to mill stability by both management and operating personnel.

The first stage in this work was to eliminate the well-known inaccuracies that arise from the use of a contact micrometer on high-speed mills, and to do this an order was placed for an X-ray thickness gauge. In addition, a study was made of some of the automatic gauge control systems manufactured and in use on other plants. These were all found to be extremely complicated as well as costly. Therefore, the electrical department designed a gauge sampling system initiating correction by means of pulses, based on the principles shown in Figs. 1 and 2.

Range Covered

As can be seen from Fig. 2, the control covers a total range of ± 10 per cent. of the preset gauge, and of this the inner dead band coyers an adjustable area of from 1 to 2 per cent. and this is the area within which no control is needed. The control is then applied to correct errors in gauge up to the limit of ± 10 per cent. Beyond this range, it is considered that the mill set-up is likely to be faulty, and the equipment then cuts out automatically and an alarm is given so that the set-up can be brought within range by manual means.

The electrical circuit is so arranged that the length of each individual correcting pulse is a function of the error signal, in that the larger the error the longer the correcting pulse, while the overall pulse time can be preset to the desired value which will give the maximum correction without instability. The adjustment of the space time between pulses is also possible and can be preset to allow the correct sampling time.

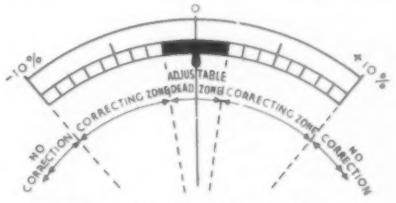


FIG. 2.—X-RAY GAUGE METER.

It should be noted that there is no automatic change of the sampling time in line with the speed of the mill, because it has been found that the advantages to be gained from this complication are relatively small. In fact, the whole system is based on a policy of doing automatically what the operator would normally do without such equipment. In addition, a series of protective arrangements to ensure the equipment will automatically fail to safety in the event of faulty operation is included, and this leaves the mill control in such a condition that the operator who receives a warning of such an occurrence can take over and carry on with normal manual operation which can over-ride the automatic system at all times. Installed in March, 1960, the automatic gauge control has been in satisfactory operation ever since, and further developments have led to the inclusion of automatic tension control between all stands.

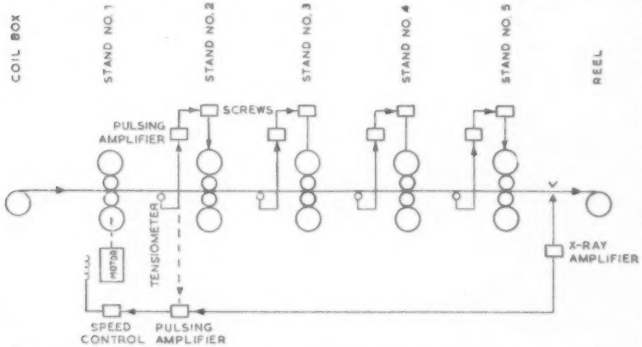


FIG. 1.—SCHEMATIC ARRANGEMENT OF AUTOMATIC GAUGE AND TENSION CONTROL FOR FIVE-STAND MILL.

One of the interesting points about the equipment is that except for warming up the mill after a roll change, it can be left switched on and in control of the mill at all times, with the obvious advantages that arise. So far, experience shows that since using this equipment, the amount of off-gauge at the front end of the coil has been substantially reduced. The system cannot improve the gauge at the tail end of the coil, as this is already provided for. A further improvement is that off-gauge associated with welds has also been reduced. Apart from a definite improvement in the amount of off-gauge, this equipment, together with the X-ray gauge, has given a very much more consistent product.

Further development work is now in hand to simplify the pulsing amplifiers used in the control system. They are being redesigned to incorporate transistors as a form of contactless switching, replacing the conventional valves and relays and thereby providing a static control system. In addition, work is now in hand to permit the installation of similar controls on the four-stand cold reduction mill at Ebbw Vale.

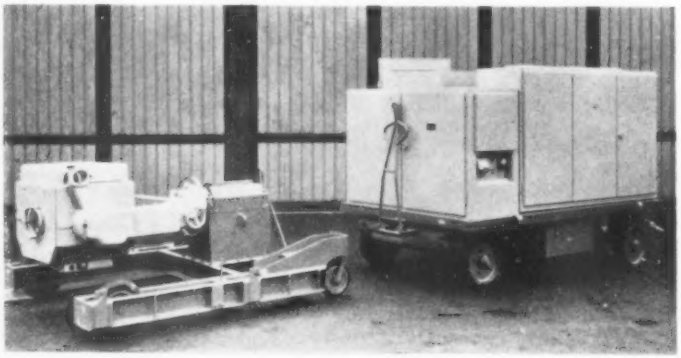
SIEMENS BETATRON FOR HEAD WRIGHTSON

ORDER for an 18 MeV Siemens Betatron has been placed with Pantak, Limited, Windsor (Berks), by Head Wrightson (Teesdale), Limited. This mobile particle accelerator, the most sensitive X-ray unit currently planned for use by UK industry, can be used for examining steel thicknesses of up to 16 in. and reflects the growing trend towards welded fabrications in plate of increasing thickness and of denser metals, a trend particularly pronounced in the fabrication of pressure vessels for the nuclear power and refrigeration industries.

The unit will operate in the heavy fabrications shop at Thornaby-on-Tees and will require less radiation safeguards than those which must be adopted for other particle accelerators and high power sources. Among the first applications of the betatron are expected to be those of weld examination on the 4-in. thick walled steam-raising units or heat exchangers for the Dungeness nuclear power station, now under construction. On this duty an examination of a 4-in. thick weld can be made in less than 2 min.

The extremely fine size of the platinum X-ray source or focal spot, at 0.3 mm. by 0.2 mm., is of particular significance in the betatron. This feature is responsible for the high-definition contact radiography which will be carried out with this unit in which penetrameter sensitivities of 0.3 per cent. will be possible when examining 10-in. thick steel plate. It also governs the enlargement technique in which such fine flaws as that of a crack some 0.1 in. deep in a 10-in. thick plate can be observed in addition to other defects which would be beyond the range of such equipment as conventional X-ray units, isotopes, and linear accelerators.

The betatron radiation head, which uses an 800-lb. magnet assembly to accelerate electrons almost to the speed of light in a doughnut-shaped tube before grazing the platinum target, weighs 1 ton and is gimbal-mounted to allow any sequence of exposures to be made at any angle without the need for relocating the machine. It is provided with internal shielding and the radiation output falls away rapidly outside the useful beam, thus simplifying personnel protection problems. Practical working conditions are frequently obtained with mobile steel protecting screens, these limiting the radiation exposure area to a minimum.



THE SIEMENS 18 MEV BETATRON.

Desoutter Tools at Moscow

A complete range of 150 portable pneumatic power tools, including drills, screwdrivers, nutrunners, grinders, nibblers, and shears, will be exhibited on the stand of Desoutter Bros., Limited, London, N.W.9, at the British Trade Fair in Moscow. The main exhibit will be a multiple nutrunner consisting of 16 SR50B/500 motors designed for the simultaneous tightening of all the cylinder head bolts on a BMC four-cylinder diesel engine. Suspension of the unit is by a vertical pneumatic cylinder, and all valves and controls are part of the range produced by Lang Pneumatic, Limited, a member of the Desoutter group.

PNEUMATIC STOWING EQUIPMENT

Some Recent Developments

DEVELOPMENTS in the design of pneumatic stowing equipment in recent years are leading to a wider application of the technique of transporting stone produced in mining operations to the point of disposal. The largest single development which has made these applications possible has been the design of low-pressure stowing plant. The use of lower pressures has made possible a reduction in the outlay of the equipment necessary for the application of pneumatic stowing, allowing the equipment to be applied in circumstances which would have been previously considered uneconomic.

The high operational costs of pneumatic stowing were generally attributed to the production of large volumes of compressed air, with wasteful pressure drops over the extensive pipe ranges to convey the stowing material to the point of disposal. These disadvantages have led to the development of low-pressure stowing equipment and the introduction of more portable plant which can be installed nearer to the coal face.

Following the successful use of inbye compressors working at low pressures in conjunction with stowing machines, Markham & Company, Limited, Broad Oaks Works, Chesterfield, has extended this application of low-pressure stowing by the introduction of an inbye blower unit (Fig. 1). The company's experience in this connection started in 1948, when a longwall face, over 300 yd. in length, was successfully stowed at working pressures less than 10 lb./sq. in. This result was largely due to the fact that no bends were used in the stowing pipeline and also the gradient of the face was 1 in 5 in favour of the load. In more normal circumstances, pressures below 15 lb./sq. in. are required.

The design of the compressor upon which the inbye blower is based, is known as the "Rootes" supercharger, which has been used in other industries for the provision of large quantities of low-pressure air. Since these blowers operate at low pressures with a consequently low compression temperature, cooling water is not necessary and internal lubrication is not required.

Blowers, usually located close to the stowing machine, have been at work in mines for stowing purposes for several years and have proved themselves to be economic, safe, and able to withstand the rough conditions.

For small outputs, or where the space to be stowed is accessible, and pipelines can be kept short and straight, only one blower will be required to operate one stowing machine. For larger outputs, or very long lengths of pipe, two blowers are used in series and the air cooled by water injection. Many blowers of this type are being used to supply compressed air to stowing machines and are powered by motors of up to 100 h.p. The maximum horsepower for two blowers in series has not exceeded 200 at the largest installation.

"Direct-on-face" Stowing Machine

This trend in the use of low-pressure compressed air for pneumatic stowing has also led to the development of a stowing machine specially designed to obtain the most efficient utilization of inbye blowers. One of the most recent developments in pneumatic stowing machines is known as the "direct-on-face" type. This machine, shown in Fig. 2, is designed for location directly in line with the stowing track, thus eliminating bends and using the shortest possible pipeline. It has a high throughput of stowing material, requires minimum maintenance, and can stow material which the conventional type cannot accept. The pressure

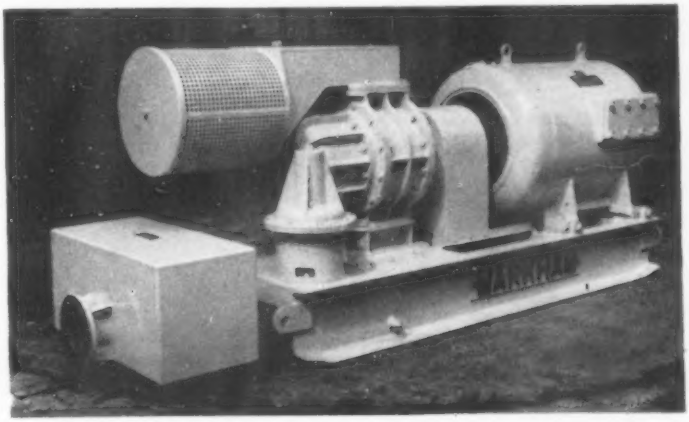


FIG. 1.—LOW-PRESSURE INBYE BLOWER.

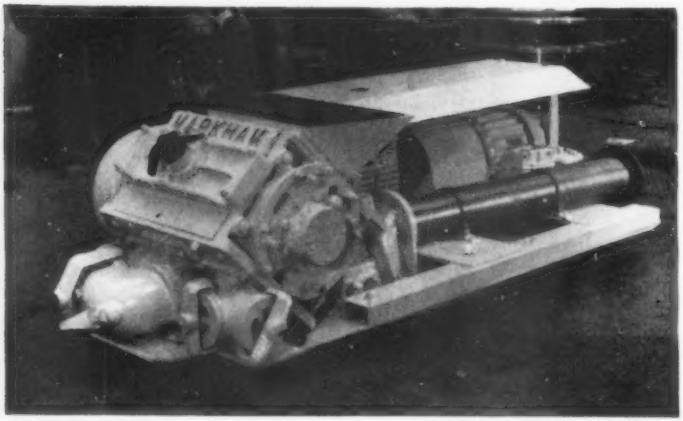


FIG. 2.—" DIRECT-ON-FACE " LOW-PRESSURE STOWING MACHINE.

of the air which can be supplied by the inbye blower is generally below 15 lb./sq. in.

The " direct-on-face " stower has a total height to the top of the hopper of 2 ft. 8½ in., its total width is 4 ft., and it is capable of stowing into the left- or right-hand sides of a longwall face, the changeover to each direction being rapidly achieved. The machine can also be arranged to stow at any angle to suit the mining layout.

The crusher stower has probably been the machine most responsible for the wider application of the techniques of pneumatic stowing. It has been designed to crush stone from both face and back rippings and dispose of it by packing it at the coal face or other suitable space. The method of operation is similar to that used in conventional stowing, the fundamental difference being that the crusher stower is capable of preparing the stone fed into it so that it can be transported through the stowing pipeline.

By the end of 1960, over 100 sets of crusher stowing equipment had been supplied to collieries. Many of these machines are in use for the disposal of ripping stone into gate-side packs and in some cases repair work on roadways is facilitated by the use of these machines for the disposal of debris.

An interesting application of the crusher stower can be found in its use in filling cavities due to falls of ground. Cavities producing up to 1,200 tons of stone have been successfully sealed to a height of 40 ft. above the position of the stower.

In other cases all the stone from headings has been disposed of in old roadways or used for packing at a nearby coal face. Also, the equipment has been used for filling disused drifts and roadways. In one application the equipment was used for filling a disused drift mine and as no drawing off work had to be done, operations were continuous using pit-heap debris which was 90 per cent. under 4 in. A daily throughput of 250 tons was regularly maintained in a two-shift operation.

With normal unprepared ripping stone, a throughput of about 50 ton/shift can be expected, although this can be greatly exceeded if special arrangements are made to ensure a regular feed for suitably sized material to the stowing machine. The amount of air used by the crusher stower is of the order of 2,000 cu. ft. of free air/min., at pressures depending on the length of the pipeline and its gradient. In lengths of pipe up to 150 yd. the pressure required is not more than 8 to 9 lb./sq. in. With a 75-yd. pipeline, incorporating a 90-deg. bend, the pressure is between 5 and 6 lb./sq. in.

Where compressed air, supplied by surface compressors, is already available throughout the pit, the use of a special control valve will automatically ensure that the quantity of air is strictly regulated to that required. Where no compressed air is available, the blower unit, which like the crusher

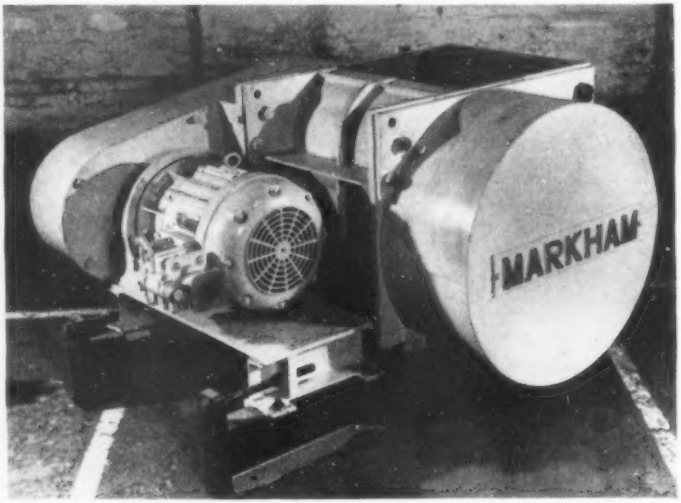


FIG. 3.—PRIMARY BREAKER, DRIVEN BY A 15-H.P. MOTOR, FOR PREPARING HARD STONE PRIOR TO STOWING.

stower, weighs about 3 tons, can be used.

When the material to be stowed contains a high proportion of hard "blocky" stone over about 8-in. size, the output of the stowing equipment is sometimes restricted and the full advantage of the system cannot be attained.

To overcome this difficulty a primary breaker, shown in Fig. 3, has been designed by Markham & Company, Limited.

This machine, like the crusher stower, works on an entirely new principle of operation, using shearing rather than compression forces to break the rock.

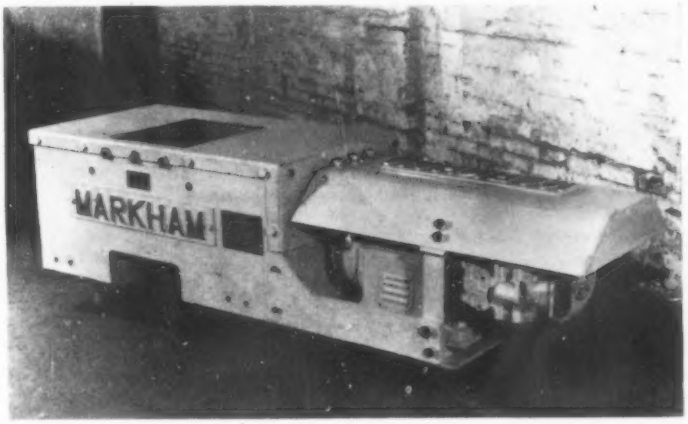


FIG. 4.—SMALL, 10-H.P. PRIMARY BREAKER FOR USE WHERE SPACE IS LIMITED.

The primary breaker was developed after difficulty was experienced on an earlier crusher-stower installation where the stone for stowing was obtained from the drivage of a cross-measure drift. During the initial drivage of the drift the material was soft and friable and the crusher stower was able to deal with this at a rate of 20 ton/hr. When hard "blocky" sandstone was encountered, however, the output was reduced to 12 ton/hr. A primary breaker was installed and an output of between 20 and 24 ton/hr. was then maintained throughout the remaining section of the drivage.

The primary breaker has been designed so that it can take large pieces of rock and reduce them to sizes which the crusher stower can handle, thus giving a more constant throughput of the equipment. Pieces of hard sandstone, 24 in. by 18 in. by 7 in., can be readily crushed in the breaker.

The primary breaker, due to the unique method of fracturing the stone, does not produce unnecessarily small pieces, and the percentage of fines is low. This feature, coupled with a slow rotation of the moving parts, greatly reduces the amount of dust produced by the crusher. The standard design of the primary breaker is such that it can be mounted over a conveyor to deliver the crushed product to the crusher stower. The breaker is driven by a 15-h.p. motor and, since the breaking forces are small, the construction does not need to be as large as other forms of crushing machinery.

It is extremely stable and no special foundations are required.

The overall dimensions are:—Height, 3 ft. 7 in.; width, 5 ft. 3 in.; length, 6 ft. 3 in. The hopper opening measures 28 in. by 19 in. and the total weight is 3 tons 16 cwt.

The construction is simple, comprising a toothed rotor which shears off the stone against a fixed anvil, and two flywheels, one of which is driven from a 15-h.p. motor by vee ropes. A smaller primary breaker (Fig. 4), driven by a 10-h.p. motor, has also been developed for use where space is limited. Arrangements have also been made for mounting this crusher over a conveyor.

Telescopic Sprag

A TELESCOPIC sprag for use on mechanized faces supported by Vanwersch or GHH link bars has been designed by Mr. F. B. Yemm, safety officer at Hemsworth Colliery, North-Eastern Division, National Coal Board. It is intended to prevent coal spalling from the face on trepanner units, thus removing a source of danger and reducing the amount of coal to be cleaned up after the machine has passed by.

The sprag consists of approximately 6 in. of the male end of a Vanwersch or GHH bar to which has been welded a telescopic tube 2 ft. 3 in. closed length. This tube can be extended to 3 ft. 9 in. The inner and outer members are held in position by a ¾-in. pin. A plate welded to the inner tubing provides an effective bearing surface.

After the sprag is linked to the bar the telescopic tube is lengthened until its face bears against the coal. When the wedge, which normally holds a bar incantilever, is tightened, the face of the sprag presses more firmly against the coal face. A wooden board can be positioned between the coal and the face of the sprag to provide a larger bearing surface to the coal face. The weight of the telescopic sprag is about 45 lb.

THE NEW 55-ton electric furnace at Altos Hornos' Baracaldo works is the largest in Spain and has a daily steel output of 275 tons.

Cold Extrusion of Steel

PROCESS of extrusion is essentially one in which a billet of metal is changed in form without loss of volume into a continuous product of uniform cross-section, which is forced through a suitably shaped die, this being always smaller than that of the original billet. The process is of relatively recent origin when compared with traditional methods of metalworking and it is rapidly becoming firmly established as a process of major importance.

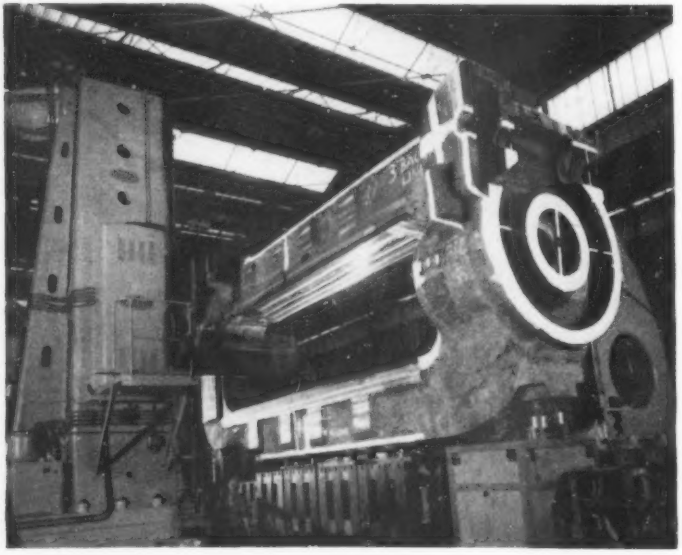
A paper on the subject, entitled "An Experimental Investigation into the Cold Extrusion of Steel," was presented by H. Ll. D. Pugh, B.Sc., F.Inst.P., M. T. Watkins, B.Sc., and J. McKenzie, A.M.I.Mech.E. (all associated with the National Engineering Laboratory, East Kilbride, Glasgow), at a special conference on "Cold Extrusion of Steel," organized by the Institute of Sheet Metal Engineering and held at the City Hall, Sheffield, from November 21 to 23.

Properties of Cold-worked Steels

In a section of this contribution the authors, discussing the properties of cold-worked steels, point out that relatively few data exist on the properties of components in the "as-extruded" condition. Information is, however, available on the effect of reduction on the hardness of cold-drawn wires and on the hardness, tensile strength, ductility, impact strength, and fatigue strength of cold-drawn bars and tubes before and after stress relief. It has been suggested that for a given amount of cold work, deformation processes in which compressive stresses predominate produce less hardening, a smaller increase in tensile strength and a smaller loss of ductility in the formed product than do processes in which the stress is predominantly tensile. Because of the complex nature of the impact resistance of the metal it is not possible to predict the influence of the predominant stress system.

The effect of reduction on the hardness of extruded rods in plain-carbon steels as determined in the current investigation was compared with that on the hardness of drawn bars and wires determined by certain other investigators, and there were significant differences in the results obtained. It was possible to compare directly the results for steels of 0.15 to 0.18 per cent. carbon only.

For reductions greater than 10 per cent. the hardness of the extruded product was almost identical with that of the cold-drawn wire, and that both were significantly harder than the cold-drawn bar. The hardness attained in cold-drawn bars of 0.23 per cent. C steel was appreciably higher than that achieved in cold-drawn wires of 0.27 per cent. C steel, and up to approximately 30 per cent. reduction the cold-drawn bar was harder than rod extruded from a 0.38 per cent. C steel. While the hardnesses attained by drawn bars of 0.61 per cent. C steel and drawn wires of 0.58 per cent. C steel was similar for reductions up to 30 per cent., those of the 0.58 per cent. C steel were lower than the hardness achieved in extruded rod of a 0.42 per cent. C steel over the range of reductions from 30 per cent. to 80 per cent. Thus, state the authors, some caution is necessary in applying data on cold-worked steels to conditions other than those investigated.



Mill Housings For Aluminium Rolling Mill

FIRST of two 180-ton mill housings for the new 148-in. aluminium rolling mill of James Booth Aluminium, Limited, is now being machined by the English Electric Company, Limited, at Netherton, near Liverpool.

The 35-ft. long casting, which is seen here on the horizontal boring machine, is one of the largest mill housings produced in the UK.

The machining tolerances range between 0.01 in. and 0.003 in. To lift the casting into position in the machine shop two 100-ton overhead cranes were used.

Metallurgical Patents in the US

Some Recent Inventions

DESCRIPTIONS of metallurgical patents given below have been taken from details published in the Official Gazette of the United States Patent Office.

Method and Apparatus for the Continuous Casting of Molten Metal

An apparatus for continuously casting molten metal, has a tiltable tundish to receive an uninterrupted stream of molten metal. The tundish is of oblong horizontal cross-sectional area, providing a single source of molten metal for simultaneously forming a plurality of individual castings, the tundish being tiltable about its major axis and having metal pouring outlets on opposite sides of the tilting axis for simultaneously pouring molten metal into moulds. The outlets of the tiltable tundish are on opposite sides of the tilting axis each having spaced small and large outlets with the large outlets on one side of the tilting axis and aligned with the small outlets on the other side of the axis so that the axes of aligned large and small outlets lie in a common plane substantially normal to the tundish tilting axis. Spaced open-topped moulds are positioned beneath the outlets so that each mould receives molten metal streams simultaneously from the aligned large and small outlets.—2,948,030.

Process of Making Refractory Shell for Casting Metal

A process for making a refractory shell into which molten metal may be cast, involves forming a multi-layer shell around an expendable pattern, comprising the steps of coating the pattern at least twice with a slurry containing a silica binder and refractory powders, applying a stucco of coarse refractory material to the slurry deposited on the pattern after each slurry coating and applying to each stucco coat a dry alkaline binder material and thereafter removing the pattern from the shell and firing the shell.—2,948,935.

Pipe-moulding Machine and Method

A pipe-moulding machine includes means for forming a sand mould in a hollow cylindrical flask. Provision is made for supporting the flask with its longitudinal axis in a substantially horizontal plane, there being also a substantially cylindrical and co-extensive pattern member for extending coaxially of the flask in spaced relation to its inner wall and coacting therewith to form an annular elongated sand receiving and shaping chamber. Means provide for imparting relative longitudinal movement to the pattern member to position it in and withdraw it from the flask. A coaxial pattern element extends through one end of the flask into mating engagement with the pattern member, provision being made for directing sand under air pressure into the annular chamber endwise around the pattern element, and for permitting air to escape from the chamber while retaining sand therein so as to fill the chamber with packed sand. The pattern element has a stationary portion forming a portion of the shaping chamber and carrying a portion of enlarged diameter forming an internal shoulder on the sand mould, the enlarged portion being movable outwardly and longitudinally of the flask relative to the stationary portion of the pattern element upon engagement by the inwardly moving pattern member. Means provide for moving the enlarged portion inwardly of the flask upon the outward movement of the pattern member whereby its enlarged diameter compacts the shoulder of the sand mould.—2,948,933.

Apparatus for the Manufacture of Centrifugally Cast Tubular Metal Articles

A refractory lined mould for use in centrifugally casting tubular metal articles comprises a hollow, substantially cylindrical metal mould having a plurality of vent holes in the wall, a relatively thin, smooth, continuous, resin bonded granular refractory lining adherent to the mould wall and covering the inner ends of the vent holes, the resin in the lining being of such a character as to burn under the heat of the cast metal and thereby destroy the bond between the refractory granules of the lining. The gases generated in the lining during casting escape through the vent holes, each vent hole having a relatively short inner portion of less diameter than its outer portion, the outer portion being packed with a relatively coarse, unbonded granular refractory, suitable means providing for preventing the escape of the packing through the outer ends of the vent holes.—2,948,934.

Ingot Mould

A mould for casting an ingot with the big end up, is of substantially square horizontal cross-section with rounded corners and having a wall thickness greatest at the top of the mould cavity and of gradually decreasing thickness downwardly of the mould cavity. The cross-sectional ratio of mould wall area to ingot area below is about 1 to 1 in the upper wall portion of the mould, the ratio being about 0.7 to 1 in the lower wall portion of the mould adjacent to the bottom of the mould cavity and gradually increasing upwardly of the mould. An integral pedestal base on the mould is of substantially square cross-section with rounded corners, the cross-sectional area of the pedestal at its base having a ratio to the cross-sectional area of the top of the mould plus the ingot of about 1 to 1, the mould cavity having substantially parallel walls over about the upper 20 per cent. The pedestal has a vertical height approaching 10 per cent. of the height of the mould, the side walls of the mould flaring outwardly into the pedestal with an increase in cross-sectional area above the pedestal, but below the bottom of the mould cavity.—2,957,213.

Exothermic Welding Method

In a method of welding to each other two metallic members of the class wherein at least one of the members is relatively elongated, both members are mounted in ultimately desired juxtaposed relation in a refractory mould cavity with the elongated member protruding therefrom through an opening in the wall.

Molten weld metal is conducted through a sprue passage into the mould cavity, the novel steps in the method being of first wrapping a portion of the surface of the elongated member with a packing of matted metallic wool, and setting the elongated member in the mould cavity in ultimately desired juxtaposed relation with the other member and with the wrapped portion of the surface positioned in the wall opening with the packing engaged with the wall surface defining the opening and compressed thereby to sufficient density to impede the flow of molten metal from the cavity through the opening and prevent escape thereof from the mould. The molten metal is then poured into the cavity in contact with the wrapped portion so that the metal will contact the surface of the other member within the cavity and will melt enough of the metallic wool to penetrate the wrapping of the elongated member and solidify in welded engagement with the two members before enough of the metallic wool within the wall opening becomes melted to allow escape of metal from the mould.—2,957,214.

Open-hearth Furnace Regenerator

An open-hearth furnace has a reversible heat-recovery system in which the exit gases and combustible air are alternately led through a system of checker brick, comprising a high-temperature checker chamber having upper and lower ends and is relatively adjacent to the open-hearth furnace in the path of exit gas flow. The furnace has a roof of non-acid refractory brick and non-acid checker brick vertical flues, an entrance for the exit gas on one side of the chamber and an outlet for the exit gas at a different level on the opposite side of the chamber. The horizontal distance across the chamber in the direction between the entrance and exit is less than the horizontal distance across the chamber perpendicular to that direction. A low-temperature chamber having upper and lower ends and being separate from the high-temperature chamber and located more remote from the open-hearth furnace in the path of exit gas flow, has an acid refractory brick lining and contains acid checker brick, there being a series of continuous vertical flues through the low-temperature checker chamber, this chamber being relatively higher at the upper end than the upper end of the high-temperature checker chamber. The mass of checker brick in the low-temperature checker chamber is substantially greater than that in the high-temperature checker chamber. A flue connects the lower ends of the two chambers.—2,959,406.

Casting Arrangement for All Metals

In an ingot mould, a chamber receives molten metal for solidification into an ingot, the chamber having an opening at the top, a lead-in conduit formed by the walls of the mould and having an increased cross-sectional area at its open upper end, the lower end of the conduit being in open communication with the mould chamber. A bell member is seated by a peripheral flange on the walls at the upper end of the conduit to serve as a closure, an annular wall depending from the bell member into the open upper end of the conduit and spaced inwardly therefrom. A valve on the bell member allows the introduction of compressed gas, while an electrical heating element mounted on the bell member is positioned to depend axially in spaced relationship into the conduit for most of its length. Molten metal fills the mould chamber and the conduit to a level above the depending wall of the bell member whereby metal lying axially and adjacent to the heating element is maintained in a molten state by the element as the metal solidifies between the annular depending wall of the bell member and the wall of the mould forming a gas-tight seal between the two.—2,960,736.

Continuously Operable Cupola Furnace for Producing Iron Having a Predetermined Carbon Content

A cupola furnace for producing iron of pre-selected carbon content has, in combination, an upper cylindrical cupola portion of predetermined diameter, a frustoconical unlined cupola portion located beneath and next to the upper cupola portion, the frustoconical cupola portion having one end of a smaller diameter than its opposite end located next to the upper cupola portion. The furnace has a plurality of tuyeres, a lower unlined cupola portion carrying the tuyeres and directly beneath the tuyeres a predetermined diameter. The lower cupola portion has directly above the tuyeres and extending from the tuyeres to the frustoconical cupola portion a diameter at least as great as the diameter of the cupola directly beneath the tuyeres, which terminate in the interior of the cupola along a circle whose diameter is approximately equal to the diameter of the upper portion of the cupola.—2,960,330.

Vacuum Melting Process

Apparatus, for use within an evacuated container, for melting metals supplied in particle form, comprises a substantially vertical feed-tube having an intake opening and open lower end forming a downwardly directed discharge opening, the said lower end being of constricted inside diameter forming an interior shoulder within the feed-tube adjacent to the discharge opening. Means provide for downwardly feeding particles of metal to be melted through the feed-tube; a thermionic cathode is adjacent to the discharge opening, while means provide for directing an electrical discharge from the cathode toward the face of the metal as it emerges from the discharge opening of the feed-tube to melt the emerging metal and cause it to drip away from the opening. A downward pressure is applied to the particles of metal immediately above and heated by conduction from the melting metal to cause sintering of the particles to form a plug supported within the feed-tube by the interior shoulder, thus blocking the discharge opening and forcing the plug through the opening as the face of the plug is melted.—2,960,331.

Rolling-mill Installation

A rolling mill is equipped with a pair of stationary roll supporting bodies, annular and drivable roller cages mounted for rotation about the supporting bodies, respectively, a number of axially parallel working rolls mounted in each roller cage for revolving movement therewith about the respective supporting body. A number of pairs of axially parallel intermediate rolls are mounted in each roller cage for revolving movement therewith about and in rolling contact with the respective supporting body, each of the intermediate roll pairs supporting on the side remote from the associated supporting body a respective one of the working rolls. Each intermediate roll comprises a number of axially serially arranged roll sections and a plurality of connecting elements located, respectively, between the roll sections to maintain them at a predetermined spacing relative to one another. Each roll section comprises a non-rotatable inner ring and an outer ring rotatably encircling it, the peripheral surfaces of some of the inner rings of each intermediate roll being concentric with their common axis.

and the peripheral surfaces of the remaining inner rings of each intermediate roll being eccentric with respect to their common axis. An improvement comprises a number of slide blocks carried by each of the roller cages for rectilinear radial displacement thereon, the working rolls being journaled in the slide blocks, and pressure being interposed between the slide blocks and the roller cages, biasing the slide blocks in a direction tending to maintain constant rolling contact between the working rolls and the corresponding pairs of intermediate rolls. A bearing member is mounted in each of the slide blocks and each bearing member is provided with an arcuate bearing surface and an arcuate guide recess, a plurality of circular sector-shaped slide elements carried, respectively, by the bearing members on the bearing surfaces and each provided with a flange engaging in the corresponding guide recess. Each of the intermediate roll pairs is provided at each of its opposite ends with a trunnion journaled in the associated slide element, and springs are interposed between the bearing members and the slide blocks biasing the bearing members to press the intermediate roll pairs against the working rolls, whereby the slide elements and intermediate roll pairs are mounted for angular movement about the respective axes of the associated working rolls.—2,960,894.

Foundry Mould Forming

A foundry mould-forming apparatus comprises means for supporting a pattern with an open-topped flask mounted thereon and finely divided mould-forming material in the flask against the pattern. Means subject the pattern to periodic jolting action to assist in distributing and compacting the mould-forming material in the flask. The means for supporting and jolting are separate, the former carrying the means for squeezing the mould-forming material in the flask against the pattern.—2,959,828.

Apparatus for Continuous Process of Steelmaking

A continuous steel producing and casting apparatus includes means for producing molten iron, for slag-separation, continuous casting, and continuous refining. An enclosed elongated vessel having an inlet and an outlet at opposite ends is inclined gradually downwardly from its inlet to its outlet end for passing molten iron in a continuous flow along the bottom of the vessel from inlet to outlet for passage to means for slag-separation, and for continuous casting. Provision is made for supplying slag-forming material to the molten iron as it enters the enclosed elongated vessel, so that a slag layer is formed overlying the flowing molten iron and flowing concurrently therewith. A gas supply opens into the vessel near its outlet end and directs a stream of oxygen-containing gas countercurrently against the flowing molten iron and slag.—2,962,277.

Holding Apparatus for Molten Metals

A mixer for mixing and storing molten metal and discharging it into a pouring vessel, comprises a movable support, a mixing container for the molten metal having a spout arranged on the support for pivoting movement about an axis extending through the container, to thereby discharge the molten metal when in the container through the spout. A drive on the supporting means operatively connects with the container for pivoting the latter about the axis. A hinged platform connects to the container for supporting the pouring vessel in a substantially horizontal position below the spout, and a means of transmission interconnects the drive with the means for tilting the platform relative to the container during the pivoting movement, which is commensurate with it, thereby maintaining the pouring vessel when supported on the platform in a horizontal position during the pivoting movement of the container whereby discharge of the molten metal into the pouring vessel is ensured.—2,962,278.

Apparatus for Charging Open-hearth Furnaces

Apparatus for charging an open-hearth furnace through a door comprises a carriage movable in a path generally parallel to the open-hearth door, a bridge mounted on the carriage for movement toward and away from the door, a first lifting platform, and means pivotally mounting it on one end of the bridge for movement about a generally horizontal axis. Means provide for raising and lowering the first lifting platform about its pivot. A second lifting platform is pivotally mounted on the end of the first lifting platform remote from the first-named means for movement about a generally horizontal axis, while means for raising and lowering the second lifting platform about its pivot and a chute are mounted on the second lifting platform for movement toward and away from the door.—2,962,174.

Automatic Control for Adjusting Rolling Mills

A rolling mill comprises work rolls with chocks, a screwdown acting on the chocks of one of the rolls for making a coarse adjustment of the pass between them. Means concentric with the screwdown and rotatable with respect thereto axially moves the chocks of one of the rolls for making a fine adjustment of the pass. High torque, low-inertia means having an extension leverage movable through a small arc is acted upon by the leverage rotating the first means through a partial revolution. A double acting fluid operated piston and cylinder act on the leverage and move the high-torque low-inertia arrangement, the thickness gauge and means being operated by directly controlling the piston and cylinder.—2,961,901.

Apparatus for Making Metal Pellets

Apparatus for making metal pellets from a freely falling stream of molten metal, comprises a reciprocating piston internal-combustion engine producing an exhaust of pulsating substantially non-oxidizing gases, and means for directing a flow of the gases against a freely falling stream of molten metal to break the stream into a plurality of globules of the molten metal, which solidify to form metal pellets.—2,961,720.

Blast-furnace Charging Controller

In a charging programme control system for a blast furnace the ore, stone, and coke are conveyed by skip hoist apparatus from a charging pit to a rotatable distributor hopper at the upper portion of the furnace, the furnace being fitted with a small bell associated with the distributor hopper, and a large bell, and wherein the small bell is arranged to open and discharge each skip load from the hopper on to the large bell and the large bell is arranged to open and drop a plurality of skip loads accumulated thereon into the furnace. A combination of means is responsive to skip car entering the charging pit for stopping the skip hoist, while a load summary programme control comprises means for pre-selecting a plural-load charging programme of ore, stone, and coke and means for filling each skip car when it enters the charging pit with the pre-selected charging material. The skip hoist programme control comprises a multi-position programme switch for automatically restarting the skip

hoist a predetermined time interval after a coke round. It comprises manual control for restarting the skip hoist on ore and stone loads, the small-bell programme control means comprising a multi-position programme switch responsive to the skip hoist programme switch for opening and closing the small bell after a skip load has left the charging pit.—2,962,175.

Machine for Making Hot-tops for Ingot Moulds

A machine for making hot-tops for ingot moulds comprises an outlet pattern for moulding the outer surface of the hot-top, an inner pattern for moulding the inner surface, a lower pattern for moulding its lower portion, the patterns together enclosing and defining therebetween a space to form a mould for the hot-top and being separable in a vertical direction relative to each other. Means provide for mechanically moving at least two of the patterns in a vertical direction for closing and separating the patterns. A feed hopper is provided for supplying material to the mould a vibrator being connected to, at least one of the patterns for imparting vibrations thereto. Means provide for moving the lower pattern in a substantially horizontal direction and for selectively closing off the upper end of the mould.—2,961,721.

Casting Molten Material in a Vacuum

Apparatus for casting molten materials in a vacuum includes a ladle having a metal exterior and a lining of refractory material and adapted to be positioned above an evacuated receiving receptacle for discharge thereinto, and a nozzle sleeve in the bottom of the ladle for delivering the molten material from it. A metal cover for the nozzle sleeve partially encloses the side surfaces of the sleeve and is interposed between the sleeve and the lining. The upper edge of the cover terminates below the upper surface of the nozzle sleeve and the metal cover is protected from the interior of the ladle by the refractory material.—2,961,722.

ASSOCIATED ELECTRICAL ACTIVITIES IN 1960

ORDERS received from the steel industry by the heavy plant division of Associated Electrical Industries (Rugby), Limited, during 1960 amounted to about £4,750,000 and covered a wide range of electrical equipment. At the beginning of the year, Colvilles' proposals for Gartcosh were announced, and orders approaching £2,000,000 were placed. Colvilles ordered electrical equipment for a new four-stand tandem cold-strip mill and a single-stand temper mill. For the cold mill, two 2,000-h.p. d.c. motors, six 3,000-h.p. motors, and a 1,400-h.p. motor are being supplied; and the temper mill will be driven by two 550-h.p. motors, with 1,400-h.p. and 700-h.p. motors to drive the tension pay-off reels. Current to the motors of the cold mill will be supplied by two generating sets driven by 14,000-h.p. synchronous motors. The temper mill drives will be supplied by mercury-arc rectifiers. For this scheme Colvilles has also ordered three new process lines, including a 63-in pickling line, a 62-in. high-speed shear line, and a 63-in. slow-speed shear line. The mechanical equipment will be of Wean design.

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The Broken Hill Proprietary Company, Limited, has ordered electrical equipment for a new rod mill in Australia, including d.c. motors with a total output of 17,700 h.p., supplied by five mercury-arc rectifiers with a total capacity of 14,500 kW. After commissioning a mercury-arc converter in its 4,000-h.p. reversing billet mill at Stocksbridge, Samuel Fox & Company, Limited, ordered a 5,000-h.p. drive for a new 40-in. reversing mill, and is proceeding to up-rate the existing 3,200 kW. mercury-arc converter equipment to 4,000 kW, 1000-0-1000 V, to supply the new mill. Guest, Keen & Nettlefolds (South Wales), Limited, has ordered drives, a mercury-arc rectifier, and control equipment for an extension to its merchant rod mill at Tremorfa. Six 500-h.p. d.c. motors and one 1,750-h.p. motor will drive the additional intermediate and finishing sections. A 2,000-kW mercury-arc rectifier, exciters, control equipment, and transistorized amplifiers will also be supplied.

It is of interest to note that an analysis of power rectifier orders received by heavy plant division of AEI during 1960 shows that, in kilowatt capacity, the ratio of semi-conductor to mercury-arc rectifiers is well over three to one, thus illustrating in a striking manner the extent to which the mercury-arc is being superseded by semi-conductors, except for applications where special voltage control requirements or the need for inverted operation favour the former type.

Abroad, a 42-in. reversing blooming mill was installed at the Durgapur Steelworks in India, and a 38-in. blooming mill was commissioned by the Rhodesian Iron & Steel Company, Limited, at its Que Que works.

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MANAGEMENT IN THE MOTOR INDUSTRY

Address to South Staffs Colliery Managers

COMPARISONS were made between the management structure of the motor industry and the National Coal Board in a paper given, on January 26, to the South Staffordshire, Warwickshire, Worcestershire, and Shropshire branch of the National Association of Colliery Managers by Mr. H. DeVille, head of the training and recruitment department of the Ford Motor Company, Limited, Dagenham.

Mr. DeVille pointed out that the motor industry was new compared with the coal industry and it therefore had the opportunity of developing modern techniques and using complete planning from start to finish. The Ford Motor Company had a geographical advantage in that out of 55,000 employees 40,000 were located at Dagenham, and the directors were all on the spot rather than operating from offices in London. The motor industry was highly competitive, which made everyone connected with management cost conscious. Out of every 10 people employed only two were skilled.

Payment to the employees was not related to output in the way of incentives, so that no onus was put on any individual. Some idea of the growth of the company was indicated by the fact that a daily output of 450 units in 1946 had increased to 2,600 by 1960. During the same time the labour force had increased from 15,000 to 55,000, and the area occupied from 2,000,000 sq. ft. to 9,000,000 sq. ft. Fixed assets had risen from £14,000,000 to £123,000,000.

Filling Key Jobs

One of the main jobs of the management was to provide vision, encouragement, and inspiration to the employees. The management sought to develop the right type of person to fill the key jobs for the future and to make sure that people who became managers were sufficiently well informed for the jobs they were undertaking. The aim was to provide the right people for the right jobs in 10 years' time.

In the discussion, the branch president, Mr. T. L. Carr said it was a departure on the part of the branch to hear of management in another industry. There were certain parallels between the mining industry and the motor industry, however, and he felt that members would also recognize in the motor industry's problems certain deficiencies they were trying to remedy.

In reply to a question as to negotiation with employees' unions, Mr. DeVille said there was a degree of consultation with 23 unions, but one agreement with them. In each plant there was a joint working committee which was part of a negotiating committee. That committee was not allowed to raise matters of pay, but would discuss questions in regard to plant. A new factory would be operating in two years' time at Merseyside. Trained men from the existing works would be ready to fill "key" jobs when that time came. Promotion to higher jobs came largely from within the personnel and the present head of the company had started from the bottom of the ladder. The company was so cost-conscious that when buying components from other firms it made inquiries as to costs of production in those firms, and if it was thought they were too high it helped them to reduce them.

Consumption of Explosives in the US

MORE industrial explosives were used in the US during 1959 than in any similar period on record, according to the Bureau of Mines, US Department of the Interior. Consumption of industrial explosives during 1959 was 1,048,576,170 lb., an increase of 9 per cent. over the previous year.

The greatest percentage increase by use in 1959 was recorded for seismographic exploration, consumption of which increased 20 per cent. over 1958. Seismographic exploration, which generally uses high explosives, also reported the use of 521,150 lb. of granular black blasting powder. The percentage increases reported in 1959 over the corresponding volume of the previous year for other industries were:—Coal mining, 4; metal mining, 4; quarry and non-metal mining, 18; railway and other construction work, 18. A total of 6,807,646 lb. of liquid oxygen explosives was used exclusively for the strip mining of coal in Illinois, Indiana, and Ohio during 1959, which was a decline of 38 per cent.

The coal-mining industry was the greatest consumer of industrial explosives in 1959. The extraction of coal required 370,027,148 lb. of all types of explosives, or 35 per cent. of all explosives used for industrial purposes in the US. Large coal-producing States of Pennsylvania, Ohio, West Virginia, Kentucky, Illinois, Alabama, and Indiana used 331,439,171 lb. of explosives, or 90 per cent. of all explosives used for coal mining.

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One of the main jobs of the management was to provide vision, encouragement, and inspiration to the employees. The management sought to develop the right type of person to fill the key jobs for the future and to make sure that people who became managers were sufficiently well informed for the jobs they were undertaking. The aim was to provide the right people for the right jobs in 10 years' time.

In the discussion, the branch president, Mr. T. L. Carr said it was a departure on the part of the branch to hear of management in another industry. There were certain parallels between the mining industry and the motor industry, however, and he felt that members would also recognize in the motor industry's problems certain deficiencies they were trying to remedy.

In reply to a question as to negotiation with employees' unions, Mr. DeVille said there was a degree of consultation with 23 unions, but one agreement with them. In each plant there was a joint working committee which was part of a negotiating committee. That committee was not allowed to raise matters of pay, but would discuss questions in regard to plant. A new factory would be operating in two years' time at Merseyside. Trained men from the existing works would be ready to fill "key" jobs when that time came. Promotion to higher jobs came largely from within the personnel and the present head of the company had started from the bottom of the ladder. The company was so cost-conscious that when buying components from other firms it made inquiries as to costs of production in those firms, and if it was thought they were too high it helped them to reduce them.

Consumption of Explosives in the US

MORE industrial explosives were used in the US during 1959 than in any similar period on record, according to the Bureau of Mines, US Department of the Interior. Consumption of industrial explosives during 1959 was 1,048,576,170 lb., an increase of 9 per cent. over the previous year.

The greatest percentage increase by use in 1959 was recorded for seismographic exploration, consumption of which increased 20 per cent. over 1958. Seismographic exploration, which generally uses high explosives, also reported the use of 521,150 lb. of granular black blasting powder. The percentage increases reported in 1959 over the corresponding volume of the previous year for other industries were:—Coal mining, 4; metal mining, 4; quarry and non-metal mining, 18; railway and other construction work, 18. A total of 6,807,646 lb. of liquid oxygen explosives was used exclusively for the strip mining of coal in Illinois, Indiana, and Ohio during 1959, which was a decline of 38 per cent.

The coal-mining industry was the greatest consumer of industrial explosives in 1959. The extraction of coal required 370,027,148 lb. of all types of explosives, or 35 per cent. of all explosives used for industrial purposes in the US. Large coal-producing States of Pennsylvania, Ohio, West Virginia, Kentucky, Illinois, Alabama, and Indiana used 331,439,171 lb. of explosives, or 90 per cent. of all explosives used for coal mining.

The Leedsall Dumper

DISTRIBUTION of the Leedsall dumper trailer, manufactured by Robert Hudson, Limited, Leeds, is being undertaken by John Blackwood Hodge & Company, Limited, London, W.1. The dumper trailer is of 5 cu. yd. capacity (7 cu. yd. heaped) and is mounted to a heavy-duty Fordson Major tractor.

The body is constructed throughout with ¼-in. steel plate, reinforced with ⅜-in. "press brake" section stiffeners.

The bottom of the unit is further strengthened by rolled-steel angles welded to the inside. The unit's chassis is of A-frame construction built from 9-in. by 3-in. rolled-steel channels. A wide spaced body front support is provided in order to secure proper weight distribution of the body to chassis.

FIG. 1.—LEEDSALL DUMPER TRAILER IN THE TIPPING POSITION, SHOWING THE SINGLE-ACTING HYDRAULIC RAMS.

The built-in rear axle beam is of 9-in. by 3-in. rolled-steel heavy section channel with fully machined stub axles fitted with heavy-duty taper roller bearings. This rigid chassis is connected to the tractor by way of a specially designed Hudson articulated coupling for which a patent is pending.

Tipping is by single-acting hydraulic rams (Fig. 1), operating at 2,000 lb./sq. in. The air compressor, which also provides power for the brakes, complete with tank, is fitted to the tractor and a quick release is provided on the air feed line.

The Fordson Major tractor is of 51.8 b.h.p. at 1,600 r.p.m., and fitted with six-speed constant mesh transmission. The loaded weight of the tractor and dumper trailer is 31,870 lb., the overall length of the combination is 22 ft. 10 in., width is 7 ft. 6 in., and the turning circle is 27 ft.

Mining Research at Nottingham University

AFTER a full year of research in the new laboratory block of the Mining Department of the University of Nottingham, the 1960 issue (Vol. 12) of Mining Department Magazine (price 5s.) reports that the new building has been found to be well suited to its requirements. The design of the new building, which includes a large general purpose laboratory flanked by smaller ones, provides ample room in which to move equipment around, thus leading to greater flexibility in research.

The technical papers in the magazine include a contribution by Prof. F. B. Hinsley, who discusses the changes in the ventilating current due to stopping a mine fan. The paper describes an investigation into how rapidly the air current slows down after the fan motor is switched off.

Welbeck Colliery, with a ventilation system served by two shafts and the underground workings consisting of two main splits in parallel feeding production faces three miles from the shaft bottoms, was chosen for the investigation. The test results show that after the fan was stopped it took 36 min. for the pit-bottom water gauge to fall completely to natural conditions. However, 97 per cent. of the fall took place in the first five minutes.

Mr. L. H. Morris, Lecturer in Mining Engineering, University of Nottingham, discusses the effect of the lighting of mine roadways with respect to the use of fluorescent tube light sources. Dr. R. L. Whitmore, in a short paper, describes the essential requirements for training coal preparation plant managers and abstracts are given of a paper by Mr. A. W. Lomas on the mining and engineering developments at Lea Hall Colliery.

INFORMATION CIRCULAR IC 120, available from the Mines Branch Publication Distribution Office, Department of Mines and Technical Surveys, Ottawa, Canada (price 25 cents), is by K. Winerton, of the Physical Metallurgy Division, and is entitled "Selection of Steels for the Avoidance of Brittle Failure."

NEW FEATURES AT TWO *Continental Steelworks*

by CHARLES W. J. CRAWFORD

(*Metallurgical Editor*)

NOWADAYS, almost every steelworks has plans to expand productive capacity, and the two continental works I visited last week were no exception in this respect. Both plants required a greater iron output and were therefore replacing existing blast furnaces by larger ones. Despite the difficulty involved, the larger blast furnaces had to be built alongside the existing ones without interrupting the operation of the latter. The existing blast furnaces were old and, by modern standards, rather small. Charging was by monorail Staehler bucket-type systems.

Naturally, the large new blast furnaces were to be charged by "the best available method"—whatever that may be. The interesting thing is that, after careful consideration of various methods, it was decided to install belt conveyor charging sytems in both these blast-furnace plants.

Different Practices

It is of further significance that the ironmaking practices at these two plants were quite different. At the plant in the Saar it was already the practice to use a proportion of sinter in the burden. The essential requirements at this plant were the ability to charge a burden of various sinter to ore ratios and two qualities of coke. In the event, a belt conveyor charging system was designed to meet these requirements for the proposed four furnaces of 6½- to 7-m. hearth dia. This system came into use towards the end of 1960 for the first of the new blast furnaces, a 6½-m. hearth dia. furnace commissioned in August of last year.

New equipment ancillary to the new furnaces will include an ore bedding and reclaiming plant, an ore crushing plant, a sinter plant, and a plant for the reception, storage, and apportioning of the sinter ore and coke. This latter plant is the nerve centre of the whole belt charging system. In its control room the burdening programme for the blast furnaces is fed to the system and sinter, ore, and coke are then charged automatically.

There are two operators only for the entire charging process, one on the receiving floor at the top of the building where the materials arrive by conveyor belt from the ore crushing plant, sinter plant, and coke ovens. The other operator is in the control room where the programmed orders for burdening the furnace cause the various bins to supply the desired amounts of coke, ore, and sinter and dose the sinter with lime if required. The arrival of materials at the furnace top is televised.

This belt charging system, now in operation for the first of the large furnaces, is planned to serve three more furnaces. The additional equipment will be a few more storage bunkers and short lengths of belt conveyors. The same control room and operators will serve the additional furnaces.

The extension scheme at the USINOR works I visited at Louvroil in northern France concerns ironmaking practice using a burden comprised of several varieties of ores. Of particular interest in this project is the design and construction of a material storage and blending tower. From this tower it will be possible to dispense, in any desired order and amount, up to nine different ores and two different grades of coke. It has ample capacity for supplying, by a conveyor belt system, three modern blast furnaces of 6½ m. hearth dia. The first of this line of larger furnaces is in course of construction and is expected to come into operation next September.

The automatic control equipment of this materials handling tower will be able to accept burdening programmes for three blast furnaces. It will then dispatch the various feeds of ore and coke in the sequences required by each furnace without the assistance of a human operator except, of course, when maintenance work has to be done.

All this sounds exciting, because it raises the question of how the blast furnaces of the future will be charged. The answer will be influenced by the experience to be gained in these new continental conveyor belt systems. This performance will be followed with great interest throughout the ironmaking world. It may be that on large modern furnaces the rapid feeding demanded by new operating techniques such as high top pressure, high blast temperature, the use of oxygen, and the injection of oil will tax the conventional hoist-charging system to its limit and that a belt-charging system will prove to be the most efficient. It is proposed to publish an article in IRON AND COAL

on the comparative merits of various blast-furnace charging systems in due course.

With regard to higher working rates of blast furnaces, recent trials of injecting light fuel oil at the tuyeres on an old 4.5-m. dia. blast furnace at the plant at Louvroil have shown that this practice can increase iron production substantially. In these trials the oil was supplied by an injector designed by IRSID, similar to but an improvement upon the injector which IRSID designed earlier for the trials carried out by the Société de Acieries de Pompey on a 4.8 m. dia. blast furnace.

The IRSID oil injector is of simple design, the two principal features being a long central tube for conducting the oil and having a concentric tube for compressed air for tip atomization of the oil jet. The injector is inserted through the blast-furnace tuyere and has its inner end positioned accurately by the central hole of a guide frame made of heat-resistant iron. This guide frame is fixed near the inner end of the tuyere so that the entry point of the oil is 20 cms. back from the end of the tuyere. The blast furnace has eight tuyeres and oil is injected at all of them at pressures ranging from 13 to 20 kg./cm.^{2}

The main characteristics of the blast furnace used in these trials and the results obtained are:—

HEARTH DIAMETER: 4.5 m. NO. OF TUYERES: 8.

USEFUL VOLUME (from tuyeres to stock line): 500 m.^{3}

BURDEN: Ores blended to give slag of lime/silica ratio of 1.25, using the grades of ore as follow:

(1) Calareous: 30 per cent. Fe of 10-30 and/or 30-70 mm. sizing.

(2) Siliceous: 52 per cent. Fe of 5-25 and/or 25-70 mm. sizing.

Scrap usage is 100 kg./ton.

	Without oil.	With oil.	Difference.
Output rate (m. ton/day) ..	370	440	15 per cent. more
Blast temp. (deg. C.)	720	860	140 deg. C. higher.
Coke consumption (kg./. ton) ..	800	690	110 kg./ton less
Hydrogen in gas (per cent.) ..	2.5	3.0	
Iron percentage analysis: Si ..	0.45	0.35	
S ..	0.10	0.075	

Rate of oil injection: 15 litres/min., equivalent to 45 kg/m. ton of iron produced.

There are to be further trials on this blast furnace. These will be made with heavy fuel oil so that comparative information will be available for deciding what practice to adopt on the first of the new large blast furnaces which are due to be blown-in next September. However, it has already been decided that some form of oil injection will be routine practice on this furnace.

During my visit to the Saar I also saw the new OLP converter plant which started operating in December as reported in our issue of December 23, 1960 (p. 1364). This 30-ton converter of the Dillinger Huttenwerke is refining iron of 1.8 per cent. phosphorus with one slagging-off in a tap-to-tap time of ¾ hr. Its performance is well up to expectations and augurs well for the 60-ton OLP converter recently started at Denain and the 140-ton OLP converters being built for the new steelworks at Dunkirk which will work on hematite iron.

"Open Days" at BISRA Sheffield Laboratories

TWO "open days" are to be held at the Sheffield laboratories of the British Iron and Steel Research Association on June 15 and 16. The last time the Hoyle Street group of laboratories held "open house" for representatives of member firms was in 1956. This year's function will therefore give visitors the opportunity of examining the many developments which have taken place since then.

The Hoyle Street premises house three of BISRA's five main divisions—steelmaking, metallurgy (general), and the mechanical working division.

In addition, the steel user section, which operates an important advisory service to industry generally, is also housed there.

Among the many displays and demonstrations planned by the steelmaking division will be the latest developments in continuous casting, and work on spray refining and rapid desulphurization. One of the mechanical working division's projects on show will be a recently developed rapid annealing system.

Prominent among the metallurgy division's projects will be aspects of its general preoccupation with the purification of steel (jet degassing, vacuum casting, etc.), work on improved speed and accuracy in analysis, and the production of high-temperature steels. These represent only a few of the many projects which will be shown.

Nitrous Fume from Blasting

THE need for a fume extraction plant for use during multi-shift blasting and the composition of the fumes from the detonation of explosives is discussed by S. R. Rabson, J. H. Quilliam, and E. Goldblatt in a paper in the October, 1960, issue of the Journal of the South African Institute of Mining and Metallurgy.

The occurrence in blasting fumes of the oxides of nitrogen is studied and the significance of the presence of nitric oxide established. The toxic qualities of the fumes are discussed and an account is given of various experiments carried out on the methods of absorption of nitric oxide and of oxidation into absorbable oxides.

The use of alkaline permanganate solution to oxidize and absorb the fumes was selected as the basis for the method of extraction. A method utilizing vermiculite impregnated with a solution of sodium carbonate and potassium permanganate was applied to remove nitrous fume from blasting gases.

The design of a plant suitable for use underground to extract fumes and dust is also described.

New Literature

READERS wishing to obtain a copy of any of the items referred to below are invited to write to the address given, at the same time mentioning IRON AND COAL. The list makes reference to some of the house magazines, catalogues, and other publications received.

CRAVEN BROS. (MANCHESTER), LIMITED, Vauxhall Works, Reddish, Stockport—Various items of the company's equipment are described in the January-February issue of Craven Machine Tool Gazette, together with news of recent installations in various parts of the world.

UNION CARBIDE, LIMITED, Alloys Division, 8, Grafton Street, London, W.1—Last year, the company became the UK suppliers for alloys "VL55" and "VL55(M)," which are used, by the plunging method, for the manufacture of SG iron. A useful guide to the use of these alloys has been produced.

GOODYEAR TYRE & RUBBER COMPANY (GT. BRITAIN), LIMITED, Wolverhampton—"If the maximum possible life of a conveyor is to be achieved, it should receive as much attention during its operation as any other piece of expensive capital equipment," states the introduction to a useful article in the February issue of Goodyear Industrial Products News.

EVERSHED & VIGNOLES, LIMITED, Acton Lane Works, Chiswick, London, W.4—An article on "Mine Fan Instrumentation" in the January issue of Evershed News shows how unmanned control stations may be introduced without decline in safety standard. The author is Mr. H. F. Goodwin, of the company's instrumentation division.

ELECTRONIC INSTRUMENTS, LIMITED, Richmond (Surrey)—For over 15 years the company has specialized in devising, developing, and manufacturing pH meters for research, development, education, industrial and process control, and medicine. A new publication, "pH Meters by E.I.L." is a well-produced catalogue describing the complete range.

HEAD WRIGHTSON PROCESSES, LIMITED, 20/24, Old Street, London, E.C.1—The result of further research and development into industrial cooling problems is outlined in a new leaflet, covering a new range of low-head cooling towers. These towers are specially designed for small industrial duties, including air conditioning and refrigeration. The leaflet reference is HWP 6102.

INDUSTRIAL WELFARE SOCIETY, 48, Bryanston Square, London, W.1—One of the finest collections of articles, essays, and commentaries on human relations topics has been published by the society under the title "Work and Leisure Digest." The author is Mr. John Marsh, director of the society. The book is obtainable only from the society, price 7s. 6d. (postage 6d.).

FERODO, LIMITED, Chapel-en-le-Frith (Derbyshire)—The company has published a new catalogue, "Friction Materials for Engineering Equipment" (publication No. 974). It contains 270 pages and consists of a separate illustrated introduction, data book, and price-list, bound together in an attractively designed cover. The data book contains details of linings, clutch discs and inserts, cone clutch linings, pads, friction wheels, sintered metal and cermet facings, and drive belts for a wide range of earth-moving and civil engineering equipment, industrial plant, and oil-drilling gear.

SAXON ENGINEERING COMPANY, LIMITED, Royal Street, Fenton, Stoke-on-Trent—Saxon screens are designed to cover an extensive range of separable materials and include screens capable of handling from 400 ton/hr. run-of-mine coal down to the finest materials. In the range are screens of the heavy duty vibratory, resiliently mounted vibratory, balanced reciprocating, and twin link types, all of which are described in a new and attractive brochure, "Saxon Screens."

BRITISH OXYGEN COMPANY, LIMITED, Bridgewater House, Cleveland Row, St. James's, London, S.W.1—The February number of Pennant, the monthly newspaper of the group, carries an interesting article on "Propane, Fuel Gas of the Future." There is a report of the opening, by Mr. J. S. Hutchison, chairman of the parent company, of Pakistan Oxygen's newest and most modern factory, which can produce 3,000,000 cu. ft. of oxygen and 500,000 cu. ft. of acetylene monthly.

HENRY WIGGIN & COMPANY, LIMITED, Thames House, Millbank, London, S.W.1—There is always a wide variety of articles to be found in Wiggin Nickel Alloys, and the latest issue (No. 60) is well up to standard. The excellent high-temperature strength and good resistance to oxidation and scaling makes possible a reduction in size and weight of furnace equipment when made of Inconel, Nimonic 75, and Incoloy DS heat-resisting alloys. Examples of such equipment are shown and some guidance given on their design in "Lightweight Furnace Equipment."

TECHNICAL PRESS, LIMITED, 112, Westbourne Grove, London, W.2—A new revised edition of "Basic Electronics" is to be published on March 16. The book, published in six parts last year, was reviewed in our issue of April 15, 1960 (p. 865). It is one of the titles comprising the publishers' illustrated course of elementary technician training. Sales of the first edition have reached 10,000 sets (60,000 parts). The book is designed to meet only the most elementary needs of young students and of those in industry who are expected to acquire the simplest knowledge of electrical principles. Part 1 deals with power supplies and rectifiers, parts 2 and 3 with amplifiers and oscillators, parts 4 and 5 with transmitters and receivers, and part 6 with frequency modulation and transistors.

W. & T. AVERY, LIMITED, Birmingham—Survey is the title of a new publication. Its purpose is to review the application of weighing, counting, and testing machines to diverse industrial problems, and show how they help management not only to find answers but also to make those answers acceptable in terms of ultimate profit. As the introduction says: "The basic industrial problem of equating labour, raw materials, and production costs to produce has, in but a short span of years, become so complex that, one might say, common arithmetic has been replaced by calculus. The craftsman gives pride of place to the cost accountant, and the chemist, together with the buyer, is the true arbitrator in the purchase of raw materials. Behind the use of labour is the expert in ergonomics, and 'clock watching' has a new connotation in time and motion study. All these activities are implied in one word—control." Survey promises to fulfil a useful purpose.

New Mine Winder Installations

ORDERS for mine winders, valued at more than £1,000,000, were received during 1960 by the heavy plant division of Associated Electrical Industries, Limited, Rugby, from a number of gold-mining companies in Africa as well as from the National Coal Board.

Of the orders for Great Britain, the most substantial was for two double-drum winders, driven by 2,850-h.p., d.c. motors for Bedwas Colliery, South Wales. Steel-tank, mercury-arc rectifier/inverter units, rated at 1,900 kW, 800 V, will supply each machine.

A four-rope friction winder, supplied by mercury-arc rectifiers, was ordered by the NCB for Mosley Common No. 4 shaft, the motor to be rated at 2,500 h.p. Other winder drives ordered include a 2,100-h.p., 407-r.p.m. for Lofthouse Colliery, a 1,750-h.p. for Woolley Colliery, a 1,450-h.p., a.c. geared winder for Merthyr Colliery, with germanium rectifiers for dynamic braking, 1,050-h.p., 750 r.p.m. motors for two tower-mounted, multi-rope a.c. friction winders at Cardowan Colliery.

Among electrically driven winders commissioned in Great Britain were four a.c. geared units at Kellingley Colliery, near Pontefract; a 3,200-h.p., a.c. winder at Abercynon Colliery, in the South-Western Division, believed to be the largest in the UK; a 2,000-h.p., a.c. unit at Penrikyber Colliery in the South-Western Division, and another geared a.c. winder of 1,500-h.p. at Cannock Wood Colliery's Deep shaft.

Also commissioned during the year was a 1,350-h.p., a.c. skipwinder at No. 1 shaft at Newdigate Colliery, in the West Midlands Division, a 1,300-h.p. unit at Fryston Colliery, in the North-Eastern Division, and a 900-h.p., a.c. winder at Bertie Pit, Lewis Merthyr Colliery.

US COKE PRODUCTION COSTS

RESEARCH report, based on actual 1960 operating costs in the US, entitled "Cost Comparison of Various Coke Production Methods" is now available ($(US)5) from the Shallway Corporation, 1000, South Fourth Street, Connellaville, Pa, USA. The report gives actual cost data for the year, from figures furnished by coal, coke, and steel companies averaged for the following types of coke oven:—Vertical slot-type by-product coke oven; horizontal slot-type semi-by-product (gas, tar, and light oil recovery only) coke oven; horizontal slot-type non-recovery coke oven; beehive non-recovery coke oven.

The report includes summary data on the following costs for all four types of coke oven:—Capital cost; capacity and operating cycle; coke yield; space requirement; operating labour requirement; operating labour cost; by-product values.

JIBBING-IN SPRAY ATTACHMENT

RESPONSIBLE for the design of a coal-cutter spray attachment to be used by the cutter operator as a cheap and efficient water spray during jibbing-in operations is Mr. W. R. Johnson, pump maintenance fitter at Alfreton Colliery in the East Midlands Division of the National Coal Board. The spray is an extension to the end link used by the cutter-man for hauling the cutter jib under the coal face while the cutter picks are in motion.

The device is very simple and can be made cheaply at colliery workshops. A piece of 2-in. by ¼-in. flat steel is used to make the extension piece from the end link, and to it is secured a short piece of steel tube bent to form an arc of a circle having a diameter of 4¾ in. Each end of the tube is screwed to take a standard spray nozzle. The "apex" of the steel tube is tapped, and a connector fitted to take the feed water supply from a ¼-in. internal diameter flexible hose.

The spray covers an arc of 180 deg., thus covering all the movements of the jib, and can be attached as quickly as the link end normally used. Both sides of the jib are sprayed, the amount of water delivered being governed by the ¼-in. valve normally used during the process of standard wet cutting. When the jib is under the coal face in its cutting position the spray is taken off, and normal wet cutting can then take place.

National Coal Board Specifications

SPECIFICATIONS recently issued by the National Coal Board include those mentioned below. The charge for each specification is 6d.

No. 214/1960 covers the requirements for calibrated, high-tensile, electrically side-welded steel chain (round link) for use with the Anderson, Boyes & Company, Limited, longwall trepanner in mines.

No. 222/1960 covers the following types of cutter:—Cylindrical, side and face, slotting, screw slotting single, double and equal angle cutters; T-slot, convex, single- and double-corner rounded cutters; metal-slitting saws; taper and parallel shank slot drills; shell-end mills; taper and parallel shank-end mills; hollow mills.

No. 223/1960 covers the commonly used types of reamers as follow:—Parallel hand and machine reamers; machine jig reamers; chucking reamers with parallel and taper shanks; hand and machine taper pin reamers; parallel and taper shank bridge reamers for hand and machine use; centre reamers and countersinks and counterbores.

No. 224/1960 is for adhesive insulating tape commonly used for insulation purposes in the electrical industry on low- and medium-voltage circuits.

New Chock for Thin Seams

A NEW friction chock for particular application in thin seams, called the Huwood T.C.R. low seam chock (Fig. 1), has been introduced by Hugh Wood & Company, Limited, Gateshead-on-Tyne 11. Its design is based on the Huwood T.C.R. friction chock used in thicker seams, the main difference being that it is provided with a fixed base in preference to the swivel type used with the larger chock. Also, instead of a swivelling head, a head offering limited articulation is used.

The new chock has the advantage of being quickly withdrawn and reset and the chocks have been found to make a substantial contribution to improved roof control, particularly at faces supported by wooden timbers. The clamping device, holding the upper member to the roof, consists of two annular rings in which the mechanical stresses are equally distributed throughout the ring substance. A feature of the clamp rings is that the grip is exerted by the whole of the inner surface. In consequence, these rings require minimum tightening when setting and are readily released when the chock is withdrawn.

To enable the horizontal setting wedges to be set at the correct tightness, the wedges are painted to indicate the distance to which they should be driven. The marking, which ensures a pre-setting load of at least 6 tons, is made individually for each chock during testing and enables the supervising staff at the face to see whether the chocks are correctly set.

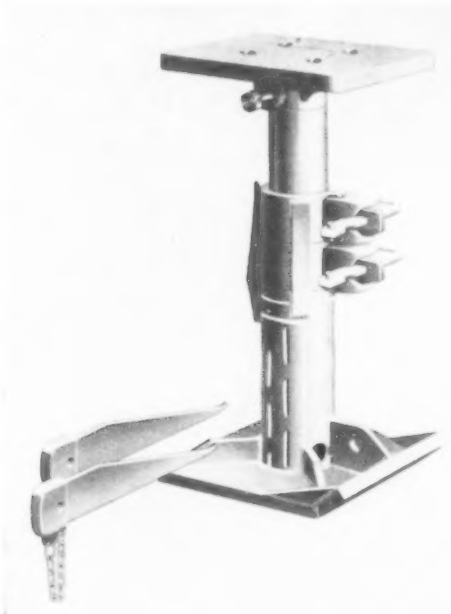


FIG. 1.—THE HUWOOD T.C.R. LOW SEAM CHOCK.

Other features include a detachable head plate which can be changed to suit varying conditions, two independently operated clamp rings to ensure that the withdrawal of the chocks can be done by more convenient stages and with greater safety, and the protection of all working parts, including the upper member, by a zinc coating.

The new chock is made in two models—type 1A and type 2. There are five chocks in the type 1A range with extended lengths varying from 23 in. to 36 in., collapsed lengths from 17 in. to 24 in. with approximate weights between 122 and 132 lb. The type 2 range has three chocks with extended length from 40 in. to 50 in., collapsed lengths from 27 to 31½ in. with approximate weights between 151 and 157 lb. The head plates and base plates normally supplied are 12 in. square, but can be varied to suit requirements.

Nylon in the Mining Industry

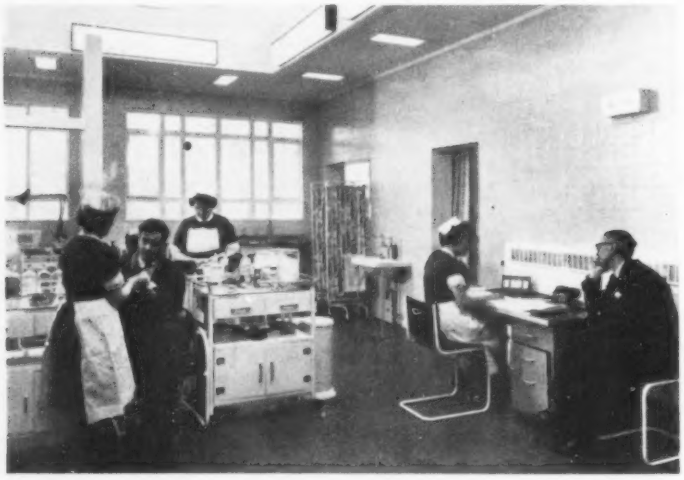
MEETING at the Wigan and District Mining and Technical College on January 12, members of the Manchester Geological and Mining Society heard a paper on "Nylon in the Mining Industry" by K. W. Anderson and R. J. Harrison, of British Nylon Spinners, Limited. The following is a synopsis of the paper.

Nylon, a generic term for a group of synthetic fibre forming polyamides is widely used in industry. Some of its major uses are as a reinforcement for conveyor belting, ventilation ducting, and tyres, and as a replacement for natural fibres in ropes, fishing nets, and filter cloths. The yarns produced by British Nylon Spinners are derived from nylon polymer made by Imperial Chemical Industries, Limited, from indigenous materials. The polymer is melted, extruded, stretched, and finally processed to turn it into a textile yarn having extremely high strength, great powers of energy absorption, high resistance to abrasion, and being entirely proofed against rotting. It is, therefore, an excellent material for conveyor belting, giving a belt a very high resistance to all forms of damage and, hence, a lower cost per ton carried.

The National Coal Board, after a lengthy field investigation, came to the conclusion that belting seldom, if ever, "wears out," but is discarded because of mechanical damage. The board further considered that the answer to its belting problems lay in the judicious use of man-made fibres. To supplement and stimulate development work by belting manufacturers, British Nylon Spinners is engaged on a full-scale investigation on the problems associated with the use of nylon in the carcass of conveyor belting. Already many belts reinforced with nylon, of both solid woven and plied construction, are in use.

RTB's New Medical Centre at Ebbw Vale

MOST of the services normally found in a hospital out-patients department are provided at a new medical centre at the Ebbw Vale Works of Richard Thomas & Baldwins, Limited. The centre, opened by Mr. H. F. Spencer, managing director of the company, on Tuesday of last week, is only a stone's throw from the corrugated iron shed where the first full-time medical officer appointed in heavy industry set out his instruments and dressings in 1942. That service was gradually extended and in 1960 there were more than 100,000 attendances at the main surgery and the four satellite surgeries, which had been built at strategic points through the 2½-mile-long works which now employs some 11,000 men and women.



THE GENERAL TREATMENT ROOM OF THE NEW MEDICAL CENTRE AT EBBW VALE. THE ENTRANCE ON THE RIGHT LEADS TO A BATHROOM AND CHANGING ROOM.

The central area of the new building provides space for a waiting room and a large records office, and placed around this are consulting rooms and treatment departments. Three full-time doctors are based at the works and each has his own consulting room. For minor injuries there is a large general treatment room. Behind this is an ambulance drive-in and a resuscitation ward, with three beds, where more serious cases can be dealt with. Next to it is the X-ray department, fitted out with a unit of the most modern design that ensures the patient receives the smallest possible X-ray exposure.

The physiotherapy department is equipped with modern equipment adequate to meet the demand, which last year totalled more than 8,000 treatments.

In the records room preliminary particulars of newcomers to the company are recorded by the nursing staff prior to examination by the doctor, and medical records of all employees are housed. A small sound-proof laboratory is provided for the use of the medical officers and as a base for the company's occupational hygiene unit when engaged on investigations at Ebbw Vale.

Apart from this main medical centre, the four satellite surgeries are still providing a 24-hr. service. Altogether the staff at Ebbw Vale consists of three doctors, a sister-in-charge, 22 nurses, eight rescue men, two hygiene supervisors, and a physiotherapist. The three doctors also cover the company's works at Panteg, Pontymister, and Abercarn, where there are permanent surgeries, all staffed by nurses.

The provision of this comprehensive service does not imply a high accident rate; last year there were only 227 accidents among the 11,000 personnel which necessitated men being absent from work, and most of these were of a minor nature. The aim of the service is both preventive and therapeutic. The preventive programme includes the selective placing of personnel, medical supervision to maintain the highest possible standard of health, control of environment making use of an occupational hygiene team and public health control in co-operation with local medical officers of health.

The therapeutic programme which is organized in co-operation with local general practitioners and hospitals provides treatment for occupational injuries and illnesses and in certain cases for non-occupational conditions. Depending on local needs, special facilities such as resuscitation, radiology, physiotherapy, and rehabilitation are provided.

Similar services are provided in the company's various sections in west Wales, the Midlands, Lincolnshire, and London. Directing them is Dr. J. S. Spickett, the doctor who first moved into Ebbw Vale Works in 1942 and is now the company's chief medical officer.

New Miniature Thermocouple Wires

Research & Control Instruments, Limited, 207, King's Cross Road, London, W.C.1, announces that the range of "Thermocoax" miniature thermocouple wires has been extended by the addition of two new and smaller sizes with outside diameters of 0.34 mm. and 0.25 mm. They are of "Chromel-Alumel" in stainless steel sheaths and are available in limited continuous lengths of up to 6 m. Type numbers are 2ABACO34 and 2ABACO25, respectively.

In Parliament

PROBE INTO NCB LOSSES

Future Coal Demand Likely to Exceed Production

STATING that a "substantial loss" was expected in coal revenues for 1960, following deficits three years running, MR. RICHARD WOOD, Minister of Power, said on Monday that the Government and the National Coal Board were examining the position. Despite this, there were abundant grounds for confidence in the industry. Demand for coal in the next few years was fairly certain to exceed supply, and it was hoped that increased recruitment of miners and improved productivity would meet the situation.

MR. WOOD was replying to an Opposition motion to reduce the Vote for his department, which was later defeated by 299 votes to 223. The Labour party's attack was aimed largely at the preference given to oil fuel. A demand was made for an independent investigation into the production costs of these fuels and into possible anti-dumping legislation.

MR. RAY GUNTER (Lab.), opening the debate, said the problem of fuel and power should be viewed in terms not of the next five years or so but of the next three or four decades. It was simply fanciful to imagine that coal, oil, and natural gas could be totally displaced by nuclear energy, and it would be "the height of madness" to abandon substantial resources of coal.

Fuel Oil Inquiry Urged

MR. GUNTER said that careful planning was necessary now to ensure a healthy future for the coal industry; 1960 happened to be a good year for the industry, but the Minister should not get "dewy-eyed" about it. The miners certainly did not take one year as the criterion for the future of their industry. No one could argue seriously, he went on, that oil imports could be reduced ruthlessly, but a careful analysis was needed of the choice between letting oil in heedlessly and causing irreparable damage to a national asset, or planning imports and the use of oil so that the indigenous asset would be kept intact.

Mr. Gunter said the Minister should give a lead to re-establish confidence that there was a great future in the industry. The Government should set a realistic minimum figure for coal production for some years ahead. Without a specific target that the men could hold on to, the Coal Board could not plan sensibly its investment and production programme. Dual-fired electricity generating stations which burned oil should be converted to coal. Open-cast working should be reduced to the lowest practical level. An independent investigation should be made into production costs of fuel oil to determine how far the price of imported oil called for action under anti-dumping legislation, and to review impartially the price policies of the oil companies. Government policy should be directed urgently to increasing coal exports.

MR. WOOD, replying, said that suggestions put forward by Mr. Gunter appeared to be an attempt to apply some of the remedies of yesterday to the problems of today. Demand for coal last year and at present was running at a considerably higher rate than coal was being produced. There were objections to the suggested action to put restrictions on the consumption of certain fuels and to fix the size of the coal industry's market. The danger was that it would almost inevitably lead to too high energy costs. The choice of a fuel policy had to lie somewhere between this extreme, and that of unfettered competition.

Mr. Wood said there were abundant grounds for confidence in the industry. The greatest of all was that demand in the next few years was fairly certain to exceed supply. With improved demand, the board had resumed general recruitment of manpower, and a couple of months ago losses had fallen to 350 a week, compared with an average rate about a year ago of 1,400 a week. Reduction of stocks this year would probably be about 7,000,000 to 10,000,000 tons. The board was aware that the added burden of the recent wage award must be offset by improvements in productivity and new efforts to reduce costs.

Turning to the finances of the industry, the Minister said requirements for working capital had been reduced and capital needs were less. Borrowings were at a much lower level than was contemplated a year ago, and turned out to be about £29,000,000. Mr. Wood said he would be less than frank if he did not give the House a broad outline of the board's revenue position at the beginning of 1961. The decision in September, 1960, to increase the price of coal substantially was taken because without it revenue prospects would be extremely bad.

The new prices only operated for the last quarter of 1960 and could not be expected to prevent a considerable revenue deficit in that year. It was inevitable that 1960 would show a substantial loss. "This is a matter of serious concern to the Government and the board. Last year was the fourth year running in which the board incurred a revenue loss. The Government, together with the board, is examining the position."

Mr. Wood said that he had been convinced during the past year and a quarter that there was a growing realization that some of the industry's problems would exist "whatever the organization, and even if those running it possessed superhuman efficiency and acumen." The answer was not to be found in guaranteed targets and other measures of protection against competition from its rivals, but in further improving efficiency by such measures as mechanization, substantial increases in output per manshift, and pressure on costs.

COL. C. G. LANCASTER (Con.), said 1960 had been

a bad year for the coal industry, and the final figures would probably show £10,000,000 to £15,000,000 of additional loss. The increase in the price of coal by 10s. a ton was not a wise thing to do because it placed an additional burden on exports from the steel industry. It would have been better to recognize that the industry was being run expensively, and the sound thing to do was to economize.

MR. GERALD NABARRO (Con.), said that more and more consumers were changing to oil because of the inconsistency of quality of coal and because of the "rubbish" supplied to the domestic market at high prices. The new chairman of the Coal Board should enforce a drastic economy campaign, starting at the top at Hobart House, where there was a "violently overloaded bureaucracy."

MR. JOHN C. GEORGE, Parliamentary Secretary to the Ministry of Power, winding up the debate, asserted that it was unworthy of the Opposition to try and expand past anxieties for the mining industry into the future. He was not saying the industry's troubles were ended. There were immense difficulties ahead, but progress had been made and there were real grounds for confidence in the future. Mr. George said that the National Coal Board could not lift its prices further, because it had almost reached "the point of no return."

No "Public Loss" from Steel Securities Offer

IN a statement dealing with next week's public offer of steel securities held by the Iron and Steel Holding and Realisation Agency, MR. SELWYN LLOYD, Chancellor of the Exchequer, rebutted a suggestion that the sale would produce a loss for the taxpayer. He said the sale, which would release about £85,000,000, meant the transfer to private ownership of about two-thirds of all the prior charges still held by the Agency in companies of which the equity had already been sold. The proceeds of the sale would enable the Agency to help finance the large development programme of its subsidiary, Richard Thomas & Baldwins, Limited, without calling on the Exchequer for funds.

Mr. Lloyd reiterated the pledge that the process of denationalization of the industry would be substantially completed in the lifetime of the present Parliament.

Asked by MR. GERALD NABARRO (Con.), whether, in relation to the £85,000,000, there had been a profit or loss to public funds, MR. LLOYD said there was no loss to public funds. These prior charges were created almost entirely at the time of the sale of equities. They were moneys provided by the Agency. Therefore the transaction had to be looked at together with the selling of the equities, and as far as four of the companies were concerned—Colvilles, Consett Iron, Dorman Long, and Richard Thomas & Baldwins—there would be a surplus of about £5,000,000 in the books of the Agency.

MR. DOUGLAS JAY (Lab.), maintained that the Chancellor appeared to be ignorant of the main facts of the transaction. As these prior stocks were taken out at par by the Agency and were now being sold at a heavy discount, he considered that the loss to the taxpayer would be about £25,000,000.

MR. LLOYD said he completely disagreed. The Government had a statutory duty to get rid of these prior charges. They were issued at the time of the sale of the equities. Unless this money had been put up, the sums received for the equities would not have been what they were. On balance in the books of ISHRA there was a surplus of £5,000,000.

Asked by MR. JOHN CRONIN (Lab.), how it was possible that shares acquired by ISHRA at 20s. now sold at 12s. 9d. and made a profit, MR. LLOYD said that they were not acquired by the Agency. This was a misunderstanding. Although it was thought that these prior charges were something which was taken over when the industry was nationalized and compensation paid for them, it was nothing of the kind.

COAL PRICE AND LABOUR COSTS

PITHEAD price of coal had risen by an average of 45s. 5d. a ton since nationalization, and about 46 per cent. of this represented increased labour costs, MR. RICHARD WOOD, Minister of Power, told MR. JOHN EDEN (Con.). Replying to questions about the shortage of mineworkers, he said that the shortage was mainly confined to the Midlands, Yorkshire, and parts of South Wales. Vacancies existed for juveniles, mechanics and electricians, and for underground workers generally. The rate of wastage, which had slowed up in the last half of 1960, was now about static.

MR. WOOD told MR. JAMES BOYDEN (Lab.) that the coal supply position varied from place to place. In some places there were particular coals, such as certain South Wales boiler fuels, for which the board could not at present meet the full demand. It could usually supply customers for whom these coals were essential, and offer adequate substitutes for others.

With regard to the closure of anthracite pits in South Wales, MR. WOOD said the need for scarce fuels had to be balanced very carefully against the high cost of getting them. The anthracite position should improve when the new mines at Cynheidre and Abernant came into full production.

KRUPP ASSETS DISPOSAL

IN a question about the delay in disposing of the Krupp coal and steel holdings, MR. EMANUEL SHINWELL (Lab.), asked: "Are we now in the position that the British Government is conniving at the delay in disposing of the holdings? Is it not the fact that this rascal Krupp got away with murder, and is now getting away with the swag?" He suggested it was clear that the governing factor in the sale of the holdings was the German public interest.

MR. J. B. GODBER, Joint Under Secretary, Foreign Office, said that it was laid down that an extension of the time for the disposal of the assets could only be granted if it could be shown that the holdings could not be disposed of "with the exercise of reasonable efforts, on reasonable terms, and on a basis which is compatible with the German public interest, and that such disposition will not be possible within the remaining time without a disruptive effect on the German capital market." He pointed out that, as for Krupp "getting away with the swag," it had never been intended to deprive him of the proceeds of the sale.

COAL-INJECTED BLAST FURNACES

COAL injection was being used in place of coke in blast furnaces at an experimental steel plant in the US recently visited by representatives of the National Coal Board and of the Iron and Steel Board, MR. RICHARD WOOD, Minister of Power, said in a written reply to DR. REGINALD BENNET (Con.).

The Coal Board believed that the use of specially prepared coal in this way would prove competitive, he added, and was discussing with iron and steel companies arrangements for an experimental programme in the UK.

IRON AND STEEL TRADE

FOR the first time for many months production of heavy steel products is keeping pace with orders for beams, joists, and sections, and in some cases the current rate of forward ordering of structural materials is lagging slightly behind the capacity of the rolling mills. The same tendency is also developing in the specifications now being issued by consumers of plate for delivery towards the end of the second quarter. It is known that customers' stocks are fairly high and there is no likelihood of any concern, until it is felt that destocking has run its course.

Pig-iron

With the exception of those foundries catering for the motor-car industry requirements, the majority are well employed, but there are sufficient supplies of all grades of pig-iron. One or two brands of hematite and low phosphorus irons are limited in production, but there is usually no difficulty in obtaining alternative irons equal in analysis and quality. The low phosphorus irons are being taken up in substantial quantities but producers can be found with tonnages to spare.

The situation is much easier for high phosphorus pig-irons and no difficulties are reported by the light, jobbing, textile, and engineering foundries using these grades.

Ferro-alloys

There has been no further change in the price of ferro-tungsten and the demand for this item is relatively quiet. Ferro-molybdenum is active and ferro-vanadium is in steady request. Specialized interest is maintained in supplies of ferro-sulphide and ferro-phosphorus and there is a good demand for both the high and low carbon grades of ferro-chrome.

Ferro-titanium attracts reasonable attention, and there is moderate support for ferro-niobium.

Semi-finished Steel

Orders on hand enable most of the re-rollers to maintain good output figures, the call for small bars and light sections holding fairly steady. The present level of demand is not, however, as high as a few months ago and additional tonnages will be required if present outputs are to be maintained. The falling off is most noticeable among the makers of hot rolled strip and bright bars; the re-rollers producing reinforcing rods and bars being as busy as ever they were.

Plentiful supplies of mild steel billets are available and in addition to forwardings from home steelworks consignments from oversea have increased stocks held by the re-rollers. All arisings of suitable re-rolling defectives and crops are readily taken up.

Finished Steel

Some customers for sections and joists are asking for delivery of certain items to be deferred as they are holding good stocks. These requests have had little immediate effect on the steel mills, but several more sizes are appearing on their current and forward rolling programmes. Sufficient orders for plate are being received to maintain present outputs, but the demand for small angles, flats, rounds, etc., has fallen away to some extent.

It is possible to place business for fairly quick delivery of bright bars in good commercial quality, flat and corrugated galvanized sheets, and cold reduced strip.

Ore Chartering

MARKETS show no particular activity and certainly from the north African coast very little tonnage has been fixed with ore. Benisaf/Holland reports 23s. 6d. for the second half of March and La Goulette also to Holland about 13,000 tons for February at 19s. 9d., both on gross terms, and a small cargo of about 2,200 tons of chrome ore from Iskanderun to Middlesbrough and Grangemouth at 56s. f.i.o. and stowed. From India, Vizagapatam/Ghent paid 59s. f.i.o. for 10,000 tons of manganese, February 25/March 10, from Brazil Vitoria/Poland 13,000 tons, March/April, at 49s. 6d., and South African charterers paid 40s. f.i.o. for an 18,000-tonner Durban-Holland for May 5/30. The West African ore market is quiet with practically no prompt cargoes available but manganese has been fixed from Takoradi to London for March/April loading at 55s. for about 5,500 tons. There is no bauxite quoting at the moment from Takoradi but Toulon/Newport secured 11,000 tons for end of March loading at the slightly lower rate of 20s.

There is no particular demand from Casablanca to the UK although 6,700 tons for February 20/27 secured 26s. 3d. for Immingham, which is fractionally higher, and phosphate from Dakar to Immingham paid 37s. on gross terms for 8,000 tons prompt.

English Steel Corporation's New Australian Venture

OFFICIAL opening ceremony of the new £A300,000 factory of the English Steel Corporation, Limited, at Dandenong, near Melbourne, was attended by Mr. W. Pugh, the managing director. He said that it was the corporation's first move into the southern hemisphere and would not be the last in Australia. One of the major reasons for starting operations in Australia was the problem of import licensing, he said.

The factory is operated by a subsidiary, ESC Tools Proprietary, Limited, and has been in production for some months, manufacturing high speed cutting tools. Mr. Pugh commented that other UK organizations were looking more and more to Australia as a means of expansion.

ONLY SIX WEEKS after the foundations were laid the new offices, stores, and weighbridge office of Refined Iron (Darwen), Limited, were ready for occupation. The building was prefabricated by Vic Hallam, Limited, Nottingham, by its new Type 6 system of construction.

Coalfield News

New NUM Secretary for North Wales Area

NEW secretary of the North Wales Area of the National Union of Mineworkers is Mr. Josiah Ellis (50), a Wrexham collier. Mr. Ellis was elected after a coalfield ballot with a lead of only 192 votes over Mr. Thomas John Jones. There were five candidates. The post became vacant yesterday (Thursday), when Mr. Ted Jones, North Wales secretary for the past 27 years, and national vice-president, retired on his 65th birthday.

Mr. Ellis has worked at Hafod Colliery, near Wrexham, for 36 years as a cutter, ripper, packer and for the last 15 years as a collier. He has been union delegate at Hafod for the past seven years. Mr. Ted Jones has spent his life in mining and investigating miners' problems. National vice-president since 1935, he has been re-elected every two years and is the longest-serving member of the union's national executive.

SENIOR FIRST AID competition of the West Midlands Divisional Coal Board was won by Highley Colliery, with Mr. J. Jones the individual prize winner.

COAL SHIPMENTS from the Hartlepools during January amounted to 105,953 tons, compared with 120,656 tons in 1960. Foreign shipments fell to 546 tons, against 4,624 tons last year.

MEMBERS of Ramsay (Loanhead), branch of the NUM have agreed to increase their weekly contributions to the local branch of the Old Age Pension Association by one penny to threepence.

VERDICT of Accidental Death was returned by an inquest jury on Mr. William Pentland (27), a colliery deputy, who was fatally injured at Walbottle Colliery (Northumberland), by a fall of stone.

ONLY 56 BOYS entered the mining industry, compared with 80 for the corresponding period in 1959, states the Hemsworth (Yorks), area youth employment officer, Mr. D. Prince, in a report on school leavers.

WHEN HARTFORD COLLIERY (Northumberland), closes this weekend 100 of the 550 men employed there will become redundant. About 60 will be retained on salvage work and the rest will be absorbed into neighbouring pits.

COAL AND COKE shipments from the River Tyne during January amounted to 598,747 tons, an increase of over 71,000 tons or 13¾ per cent. on January, 1960. There was a drop in foreign trade, but a rise in coastwise shipments.

TO MAKE WAY FOR a light industrial estate which may be built on the site, a 2,000,000 cu. yd. colliery tip, covering 23 acres at Newbridge (Mon), is to be moved. The first loads of shale, from the old South Celynen Colliery, were taken away last week.

TEAM AND INDIVIDUAL awards in the annual junior first-aid competition of the South Staffordshire and Shropshire Area of the West Midlands Divisional Coal Board were won by Granville Colliery. The individual competition was won by Mr. M. Smith.

AT THE NEWCASTLE inquest on Mr. Harold Stringer (40), a miner, who was killed in an underground accident at Wolstanton Colliery (Stoke-on-Trent), last week, the coroner said the cause of death was asphyxia following traumatic compression of the chest. The hearing was adjourned until March 3.

CLAIM by nearly 1,500 National Coal Board lorry drivers in the north-west for concessionary coal or a weekly reimbursement has been rejected by an industrial court, which announced its decision in London on Tuesday. The men's demand was for six tons of coal a year or 12s. weekly in lieu.

SHIPMENTS OF COAL through Garston, Liverpool, in January, with the figures for coke in parentheses, were: Northern Ireland, 74,485 (783) tons, Eire, 20,840 (nil) tons, Isle of Man, 3,506 (31) tons, foreign coke, 372 tons, foreign bunkers 143 tons, other coastwise bunkers 13 tons, making a total of 100,173 tons.

NCB ENGINEERS have discovered a rich seam of coal at the top end of the Garw Valley, 10 miles from Bridgend (South Wales). Seams in the old pits are are becoming exhausted. Underground drivages at the Garw and International collieries have struck the rich Gellideg seam, which some geologists doubted existed so far north.

MARCH ISSUE of Mining Review, the National Coal Board's newsreel, features the commissioning and opening of Cynheidre Colliery, near Swansea; the open day at Bestwood Colliery (Notts); the new Manchester Domestic and Trades College; and the boys from Aberaman training centre entertaining local old age pensioners at their annual dinner.

WITH 476½ POINTS, Wellesley Colliery No. 1 team won the senior ambulance competition of the East Fife Area, Scottish Divisional Coal Board, at Buckhaven, last weekend. They also took the awards for the best No. 1 and No. 2 men. For the second year in succession the East Ayr Area junior ambulance competition, held at Lugar, was won by Fauldhead Colliery, Kirkconnel.

THEIR FIFTH success in the junior competition since 1953, Hem Heath Colliery won both senior and junior trophies in the North Staffordshire Area first-aid competitions last weekend. Fifteen teams from five collieries took part in the competition. Presentations were made by Mr. H. Lockett, Area NUM secretary, Mr. A. C. Beaton, assistant Area general manager, and Mr. G. H. Thomas, HM Inspector of Mines.

PRODUCTIVITY in the West Midlands Divisional Coal Board reached a record level in the week ended February 11. At the coal face OMS reached 95.6 cwt., 5 cwt. higher than the previous best figure achieved a week earlier. The overall productivity figure of 30.3 cwt. was 1 cwt. higher than the record. In the South Staffordshire and Shropshire Area overall productivity was 28.8 cwt., more than 5 cwt. higher than the previous best performance achieved two months earlier.

Pithead Gear Installation Does Not Hinder Production

USING a 25-ton capacity, lorry-mounted crane supplied by Mobile Lifting Services, Limited, of Rotherham (Yorks), one of the Tarmac, Limited, group of companies, the installation of new pithead gear at the coal and man winding upcast shaft at Lady Windsor Colliery, Ynysybwl (Glam), has been completed in less than six weeks.

The work was carried out on behalf of Naylor Bros., Limited, mining engineers, of Golborne (Lancs), main contractors for head gear to the National Coal Board. The head gear was supplied by Dorman Long & Company, Limited, and came from the new mill at Lackenby.

Biggest installation problem was placing the new girders underneath the bell and guide rope platform on the existing head gear, while keeping the shaft in operation.

THE COAL TRADE

MILDER weather during the past week has enabled merchants in some areas to catch up on orders for house coal. Nevertheless, demand continues to be fairly heavy and the steady and better forwardings have been welcomed. Anthracite supplies, however, show no improvement and are a source of embarrassment to merchants. Demands for industrial varieties remain strong, but a steady movement of supplies is ensuring that no shortages arise.

DERBYSHIRE

Merchants are facing a firm domestic demand and, in most cases, they are willing to accept anything offered outside contract commitments in an effort to meet the current need. Best and hand-picked coals are coming forward fairly well and demand is being met without undue delay. The better types of screened cobbles and brights are keenly sought, and supplies show some slight improvement. Cheaper brights are in strong request, and supplies are only moderate so that delays in distribution are at present unavoidable. Best large nuts are in steady request, and all available tonnages are readily accepted for prompt disposal. Washed medium nuts are very popular, but adequate supplies are not available at the moment. Washed doubles are in steady demand, and most inquiries are being handled fairly well.

Domestic coke nuts are subject to heavy pressure, and all available transport is actively engaged in delivery from good stocks at local works. Premium smokeless fuels are becoming increasingly difficult to obtain, and delays on orders are building up. Domestic anthracites continue to be slow and allocations are restricted. Phurnacite is also much more difficult, and little relief is now available in this direction. Small anthracites are subject to heavy delay, and here the situation is a very precarious one, with nothing available in substitution.

Industrial consumers are taking delivery of full contract commitments and on the whole a steady flow of supplies is being maintained. Nutty slacks are in good demand, and there is a continuous flow of deliveries. Dry screened nuts are in firm request, and all available tonnages are readily absorbed. Hard steams are also keenly sought, and forwardings are reasonably satisfactory. Washed fuels are in keen request, and while there is a steady flow of supplies, these are being obtained with increasing difficulty from the local landsales.

CLIFTON MAY BECOME A DRIFT MINE

ONE of the oldest pits in the country, the 90-year-old Clifton Colliery (Notts), may become a drift mine. Three boreholes have been sunk near the present shafts to explore the possibility, although a spokesman for the East Midlands Divisional Coal Board said that the matter was still in its early stages and there would be no decision taken for six months.

A fault under the River Trent—under which the colliery works—was revealed some years ago. The ground was said to have sunk 95 ft. at this point, with the resultant lowering of the coal strata. When the exploratory shafts were sunk, they passed through 24 coal seams—the richest at a depth of 167 yds. Clifton produces about 10,000 tons of saleable coal a week at present.

Coal Stocks Dwindling Rapidly

FAR from there being any let-up in the demand for coal, the amount lifted from pithead and opencast stockpiles in the week ended February 11—over 670,000 tons—is the greatest since coal stocks began to bother amateur and professional politicians. Stocks at 25,560,000 tons are now 8,000,000 tons down on the comparable figure last year.

For the first time for a very long time no change was recorded in the number of face workers—now 219,460—and the total employed fell by only 60 to 583,020. Productivity, meanwhile, continues to improve. At the face it has reached 82.36 cwt., 3.6 cwt. better than a year ago, and overall it is now 28.88 cwt., 0.84 cwt. better.

There were 583,020 wage-earners on colliery books on February 11, against 625,910 on February 13, 1960, the numbers engaged at the coal face being 219,460 and 239,710 respectively. Total absenteeism (all workers) in the week ended February 11, was 18.89 per cent., compared with 14.65 per cent. in the week ended February 13, 1960. Output at the face was 4.118 tons and overall 1.444 tons in the week ended February 11, compared with 3.938 and 1.402 tons in the week ended February 13.

The following table gives (in tons) the revised output of saleable mined coal by division in the week ended February 18, and the tonnage lost through all causes (holidays, disputes and go-slows):—

Division.	Week ended February 18, 1961.		Week ended February 20, 1960.
	Total output.	Tonnag clost.	Total output.
Scottish ..	346,000	5,000	370,000
Northern (N&C) ..	247,000	—	240,000
Durham	458,000	—	472,000
North-Eastern ..	809,000	12,000	855,000
North-Western ..	246,000	1,000	275,000
East Midlands ..	884,000	1,000	924,000
West Midlands ..	284,000	—	291,000
South-Western ..	369,000	3,000	410,000
South-Eastern ..	29,000	—	24,000
Great Britain—			
Deep-mined coal ..	3,672,000	22,000	3,861,000
Other deep-mined (including licensed mines) ..	40,000	—	56,000
Open-cast coal ..	183,000	—	167,000
TOTAL	3,895,000	22,000	4,084,000

D. NAPIER & SON, LIMITED—Mr. P. J. Daglish, who joined the company as a special executive last September, has been appointed to the board as commercial director.

British Blast Furnaces in the December Quarter, 1960

(These tables are published through the courtesy of the British Iron and Steel Federation.)

Derbyshire, Leicestershire, Notts, Northants, and Essex.

Name of firm.	In blast at end of the fourth quarter, 1960.					Weekly average in blast.	Total existing at end of quarter.
	Hematite.	Basic.	Foundry and forge.	Ferro-alloys.	Total.		
Ford Motor	—	—	1	—	1	1	1
Holwell Iron	—	—	1	—	1	1	3
Kenishaw Iron	—	1	1	—	2	2	2
Sheepbridge	—	1	—	—	1	1·7	2
Stanton Ironworks: Stanton-by-Dale	—	2	3	—	5	5	5
Staveley Iron & Chemical	—	2	2	—	4	3.4	4
Stewarts and Lloyds: Corby	—	4	—	—	4	4	4
Wellingboro' Iron	—	2	—	—	2	2	3
TOTAL	—	12	8	—	20	20.1	24

Lancashire (excl. N.-W. Coast), Denbighshire, Flintshire, and Cheshire.

Brymbo Steel Works	—	1	—	—	1	1	1
Darwen & Mostyn Iron	—	—	—	1	1	1.1	2
Lancashire Steel Manufacturing	—	2	—	1	3	3	4
Summers, John	—	2	—	—	2	1·9	2
TOTAL	—	5	—	2	7	7.0	9

North-West Coast.

Barrow Ironworks	1	—	1	—	2	2	2
Charcoal Iron	—	—	1	—	1	0.8	1
Millom Hematite Ore & Iron	2	—	—	—	2	2	3
United Steel: Workington	2	—	—	1	3	3	3
TOTAL	5	—	2	1	8	7.8	9

Lincolnshire.

Appleby-Frodingham Steel	—	4	—	—	4	4	4
Lysaght's Scunthorpe Works	—	3	—	—	3	3	3
Thomas, R., & Baldwins: Redbourn	—	3	—	—	3	3	3
TOTAL	—	10	—	—	10	10	10

North-East Coast.

Consett Iron	—	3	—	—	3	3	3
Dorman Long (Steel): Acklam	—	2	—	—	2	2	4
Redcar	—	—	—	—	—	—	2
Bessemer	—	2	—	1	3	3	3
Clay Lane	—	2	—	—	2	2	2
Gjers, Mills	2	—	—	—	2	2	3
Skinningrove Iron	—	1	—	—	1	1.9	3
South Durham Steel & Iron: West Hartlepool	—	2	—	—	2	2	3
Cargo Fleet	—	2	—	—	2	2	3
TOTAL	2	14	—	1	17	17.9	26

Scotland.

Bairds & Scottish Steel: Gartsherrie	1	1	—	—	2	2	4
Carron	—	—	1	—	1	1	2
Colvilles: Clyde Iron Works	—	3	—	—	3	3	3
Ravenscraig	—	1	—	—	1	1	1
TOTAL	1	5	1	—	7	7	10

South Wales and Monmouthshire.

Guest Keen Iron & Steel: Cardiff	1	2	—	—	3	3	4
Thomas, R., & Baldwins: Ebbw Vale	—	3	—	—	3	3	3
Steel Company of Wales: Margam	—	4	—	—	4	4.2	5
TOTAL	1	9	—	—	10	10.2	12

The Scrap Markets

Cast-Iron Arisings Still at a Premium

ONLY in South Wales does the pressure for scrap appear to be lessening. Elsewhere merchants are kept busy collecting and processing as much material as they can get, and even in the West and the Midlands available quantities of suitable cast-iron and steel scrap arising are well short of requirements.

The vast majority of the scrap now being handled is from home sources and it is reported from the North-east Coast that imports of scrap have now ceased, the occasional cargoes being unloaded being coastwise shipments from the southern parts of the country.

Cleveland—There is plenty of activity at the scrap yards and although the steelworks are well stocked they continue to accept large tonnages of steelmaking scrap.

Short heavy steel scrap is not so plentiful, but good supplies of cast-iron material are reaching the foundries, and balers of blast-furnace scrap are sending large quantities of materials forward.

Scotland — In Glasgow and the west of Scotland business continues along the usual lines. At the moment there does not seem to be any great tendency for an expansion in business, much as this would be welcomed by both merchants and consumers.

With the longer hours of daylight and better weather conditions those engaged in outside collection of scrap should now be able to show improved tonnages.

Steelworks are open

to receive all available supplies of heavy and basic scrap and, at the present time, there are no restrictions on deliveries so that no difficulty is experienced in disposing of material as it is produced.

The output of turnings is being fairly well maintained and regular consignments are being dispatched to the various consuming works.

The production of cast-iron borings is about average and supplies of this grade of scrap are being sent forward to the blast furnaces as soon as they can be collected.

The improvement at the cast-iron foundries has been maintained and it is reported that available supplies of cast-iron scrap are not sufficient to meet the demand from the foundries.

There is a fair amount of keen competition among consumers for parcels of scrap as and when they arise and merchants are constantly pressed to augment deliveries.

South Wales — The demand — even for heavy and better grade scrap—is noticeably falling off and certain of the steelworks are declining to accept offerings of heavy grade scrap—at least for the time being.

There is little or no movement in the lightweight material and the area cannot boast much activity in the scrap market generally. However, cast-iron scrap is scarce and the steelworks can take all that can be found.

British Blast Furnaces in the December Quarter, 1960—*continued*

Staffordshire, Shropshire, Worcestershire, and Warwickshire.

Name of firm.	In blast at end of fourth quarter, 1960.					Weekly average in blast.	Total existing at end of quarter.
	Hematite.	Basic.	Foundry and forge.	Ferro-alloys.	Total.		
Goldendale Iron	—	—	1	—	1	1	2
Shelton Iron & Steel	—	3	—	—	3	3	3
Stewarts and Lloyds: Bilston	—	1	—	—	1	1	2
TOTAL	—	4	1	—	5	5	7
Sheffield.							
Park Gate Iron & Steel	—	2	—	—	2	2	2
GRAND TOTAL	9	61	12	4	86	87·0	109

Weekly Average Number of Furnaces in Blast during the December Quarter, 1960, and the Previous Four Quarters

District.	1959.	1960.			
	Dec.	March.	June.	Sept.	Dec.
Derby, Leics., Notts., Northants, and Essex	17.6	18.8	20.6	20.3	20.1
Lancs. (excl. N.-W. Coast), Denbigh, Flint, and Cheshire	4.7	6.5	6.4	6.9	7
Lincolnshire	8.5	10	8.4	9.3	10
North-East Coast	16.1	16.4	17	17.6	17.9
Scotland	5.8	5.9	6.9	7	7
Staffs., Shrops., Worcs., and Warwicks.	4.6	4.6	4.5	5	5
South Wales and Monmouth	11	11	11	10	10.2
Sheffield	2	2	2	2	2
North-West Coast	7.4	8	8	7	7.8
TOTAL	77.7	83·2	84.8	85.1	87.

The following companies have furnaces in course of construction or rebuilding:—J. Lysaght's Scunthorpe Works, South Durham Steel & Iron Company, West Hartlepool Works, Colvilles, Ravenscraig Works, Ford Motor Company, and Barrow Ironworks.

Southern Rhodesia's New Wireworks

QUE QUE, Southern Rhodesia, will take another step forward as the growing steel centre of the country when a local wireworks goes into full production at the end of next month. The town will play a major part in supplying the total mild steel wire requirements of the Federation of Rhodesia and Nyasaland—12,000 tons a year. The development—which is at the wireworks of Lancashire Steel (Rhodesia) (Pvt.), Limited, —will also save the Federation £600,000 a year in wire imports.

An adequate supply of steel rods has been assured until the company's own rod mill, now under construction, is ready for operation. Additional wire drawing and barbing machines and a new galvanizing plant, which will treble the present output of galvanized wire, have been installed.

Employers are Criticized for "Hanging on to Labour"

ENGINEERING companies in the Midlands and the South are being prevented from increasing output by shortages of almost every class of skilled workers, including turners, fitters, machine setters and operators, tool makers and precision fitters, draughtsmen, erectors, and sheet iron and metal workers, the British Employers' Confederation stated last week.

The confederation criticizes employers "who are content to hang on to labour they can no longer fully employ in the foreseeable future." It also blames trade union leaders who have a vested interest in keeping labour in their crafts in short supply, and who cry "redundancy" every time men have to change their jobs—"even though they may only be going across the road for something just as good."

Urging unions and employers to co-operate in the task of increasing labour efficiency and economy in the use of manpower, the federation says that "labour shortages will persist, unless this country runs into a recession more serious than anything it has encountered for some years." The most likely cause of recession would be loss of competitive power because production costs were too high, due in turn to the available labour force not being employed to the best advantage.

Orders Placed

Motorway Contract for Dorman Long

STEEL bridges on the Lancashire section of the Birmingham-Preston motorway are to be supplied and erected by Dorman Long (Bridge & Engineering), Limited. There are 42 bridges with steel superstructures planned for the 26-mile stretch between Warrington and Preston, involving 7,200 tons of steelwork, of which nearly 6,000 tons will be universal beams.

The contract is worth about £670,000 and was placed by Leonard Fairclough, Limited, which has contracted to build the road jointly with Sir Alfred McAlpine & Sons, Limited.

POLAND has ordered textile machinery worth approximately £350,000 from Platt Bros. (Sales), Limited, Oldham, a subsidiary of Stone-Platt Industries, Limited.

ORDER for 55 self-contained "Keepalite" junior emergency lighting equipments has been placed with Chloride Batteries, Limited, by Vauxhall Motors, Limited.

LABORATORY and research building at the Rotherham works of Steel, Peech & Tozer, branch of the United Steel Companies, Limited, is to be built by J. Gerrard & Sons, Limited.

ELECTRICITY CORPORATION OF NIGERIA has ordered 15 miles of 33,000-V. flat oil-filled pressure cable from Enfield-Standard Power Cables, Limited. The contract is worth £200,000.

REPEAT ORDER for earth moving equipment made by AEC, Limited, has been ordered by R. A. Davies (Midland), Limited. The £112,000-order calls for 15 machines ranging in capacity from 10 to 15 cu. yds.

AN ORDER WORTH £200,000 for farm machinery for Finland, has been won by R & B (Engineers, Sheet Metal & Fabrications), Limited, Grimsby. Founded only four years ago, this is the firm's first export order.

CYCLIC CATALYTIC OIL GAS PLANT for Alliance & Dublin Consumers' Gas Company has been ordered from P. G. Engineering, Limited, an associate of the Power-Gas Corporation, Limited, of the Davy-Ashmore, Limited, group.

FIVE TRANSFORMERS for the Hazlewood power station, 90 miles east of Melbourne, have been ordered from Associated Electrical Industries, Limited, by the State Electricity Commission of Victoria. The contract is worth £400,000.

AN ORDER for a complete bulk handling and storage plant for flour, granulated sugar, and wholemeal has been given to Henry Simon, Limited, a member of the Simon Engineering Group, Limited, by McVitie & Price, Limited, Edinburgh.

FOUR 12,000-gal. a day sea-water evaporators, together with associated equipment, have been ordered from Richardsons, Westgarth & Company, Limited, by the Air Ministry. The plant will provide drinking water for RAF personnel in the Middle East.

EAST GERMAN CONCERN has placed a £53,000 order with R. H. Windsor, Limited, Chessington (Surrey), for the largest of its range of injection moulding machines—the AP335. The machine weighs 73 tons and is capable of moulding articles up to 210 oz.

TWO BRITISH FIRMS have secured orders from the Caima Pulp Company, of Portugal, in connection with its new pulp mill being constructed some 70 miles from Lisbon. Associated Electrical Industries, Limited, is providing power house equipment, low-tension and high-tension distribution switchgear, control gear, and nearly all the electric motors needed. This contract is worth £1,000,000. Babcock & Wilcox, Limited, is supplying the boiler plant and will be associated with AEI generating plant and power distribution equipment.

SELF-ADVANCING hydraulic power supports for the André Dumont Colliery in Belgium have been ordered from A. G. Wild & Company, Limited, Aycliffe (Co. Durham). This contract is worth £39,000, and another recent order for railway heating fittings for South Africa brings the total export value to over £100,000.

CONTRACT awarded to William Boby & Company, Limited, water treatment engineers, of Rickmansworth (Herts), for a water and power supply plant at Zliten, Libya, has been extended. The Libyan Public Development and Stabilization Agency has accepted a tender of about £45,000 for the second phase of the work.

MEMBER of the Stone-Platt, Limited, group, Hayward Tyler & Company, Limited, has received an order from Babcock & Wilcox, Limited, to supply 16 low-pressure and 16 high-pressure glandless motor pump units for water circulation in the heat exchangers for the Sizewell nuclear power station. The contract is worth about £100,000.

DURING RECENT MONTHS the Central Electricity Generating Board has placed contracts for power stations, transmission lines, and transforming stations, amounting to approximately £4,289,000. Included in these was an order for Babcock & Wilcox, Limited, for ash and dust handling plant, while transformers have been ordered from the English Electric Company, Limited, Ferranti, Limited, and Johnson & Phillips, Limited.

TWO ORDERS in connection with the Kincardine power station have been placed with John Thompson Industrial Constructions, Limited. The first, worth £299,302, is for fly ash extraction plant for two boilers. The second is worth £702,212, and is also for hydraulic plant to handle the accumulation of fly ash. This plant will also help in the plan to pump fly ash and dust slurry to Longanner to be reclaimed for agricultural uses.

CONTRACT worth £500,000 for automatic bag filter plants for carbon black has been secured by Tilghman's, Limited, Altrincham, a subsidiary of the Staveley Coal & Iron Company, Limited, from the Soviet "Techmash" Trading Corporation. The order involves the supply and installation of eight plants, half of them for the car factory being built by a British consortium at Dnepropetrovsk in the Ukraine, and the rest for a factory in Rostov.

TWO ORDERS, which together total £565,000, have been placed with Associated Electrical Industries, Limited. One, worth about £315,000, is to supply switchgear and transformer equipment for extensions to the Central Electricity Generating Board's grid substation at Carrington (Lancs). The other is for a 14 mW turbine generator, complete with condensing plant and feed water equipment, to the value of over £250,000, for a power station at Dekhelia, Cyprus.

MECHANICAL EQUIPMENT for a new continuous casting plant in Australia is to be supplied by Distington Engineering Company, Limited, Workington, a subsidiary of the United Steel Companies, Limited. An order for the plant has been received by Concast, AG, of Zurich, from K-M Steel Products, Limited, Richmond, New South Wales. It will be a twin-strand unit, designed to cast 2 in. and 3 in. square steel billets and 8 in. by 4½ in. slabs. The new plant is being designed by Schloemann, AG, of Dusseldorf, who, together with Distington, is an associate of Concast, AG, in the field of continuous casting.

MODERN MINING METHODS

The Five Leg Chock is proving the most adaptable self advancing support yet devised. It can operate with all types of power loaders and can be adapted—

- To a composite support with Intermediate 2 legged Mechanised Goal Posts so that newly exposed track behind a Trepanner, etc., can be supported immediately.
- To maintain reasonable safe travelling tracks in thin seams.
- To steep seam working.

Photograph by courtesy of No. 1 Area E.M. Division, N.C.B.

THE GULLICK-SEAMAN 5-LEG CHOCK

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G26

NEWS IN BRIEF

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USE SECAR 250

(an iron-free white calcium-aluminate cement)
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Super Duty and Special Conditions of:—
Higher Temperatures up to 1800°C.
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Resistance to Slag attack.
Resistance to products of combustion.
Write for booklet "SECAR 250".

* Refractory Concrete (stable under load up to 1350°C) is made with crushed firebrick and Ciment Fondu. Ready for any purpose in 24 hours

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AP/59

cent. increase over the previous week, states the Iron and Steel Institute. Output of raw steel this year totals 10,406,000 tons, a fall of 45 per cent. compared with the 18,930,000 tons produced in the same period last year.

ILLUSTRATED lecture on "The Fundamentals of Foundry Management" was given to the Stoke-on-Trent section of the Institute of British Foundrymen last week by Mr. A. Kirkham, of the foundry division of David Brown, Limited. He discussed aspects of management organization as applied to large and small foundries.

NOWOTKI STEELWORKS, of Ostrowiec, Poland, with a current annual production of 380,000 metric tons of raw steel, is to expand its output by a further 500,000 tons a year by 1965. The cost of the first stage of expansion, in which a forgings plant with a 6,000- to 8,000-ton press will be erected, is put at 1,500,000,000 zloty.

TWELVE of Venezuela's leading business men and industrialists arrived in Britain on Sunday, on a 14-day fact-finding tour of British industry. The visit is jointly sponsored by the Board of Trade and The Western Hemisphere Exports Council, and the members of the party represent all sections of Venezuelan industry and commerce.

FACTORY costing about DM25,000,000 (£2,100,000) is to be built at Coblenz, Germany, by Girling, Limited, vehicle and aircraft brake manufacturers, of Birmingham, a subsidiary of Joseph Lucas (Industries), Limited. The factory will supply the motor industry in the Common Market countries, and production will start towards the end of 1962.

FIVE INDIAN TECHNICIANS arrived at the Wednesbury works of F. H. Lloyd & Company, Limited, last Friday to undergo training for senior management positions in the new steel foundry at Chittaranjan, west Bengal. The company is acting as consultant to the Indian Railway Board for the erection of buildings, installation of plant, and training of personnel for the Indian foundry which is to make castings for locomotives.

AUSTRIA used 7.4 per cent. more solid fuel in 1960 than in 1959. Consumption was divided into 3,925,171 metric tons of hard coal and hard coal briquettes; 6,043,269 tons of brown coal, brown coal briquettes, and brown coal coke; and 2,852,675 tons of hard coal coke. Hard coal consumption rose by 14.2 per cent. and that of hard coal coke by 15.6 per cent. Main reason for the increase was the greater demand from the ferrous metals industry.

LICENCE for the use of the LD process has been granted to a 300,000-metric-ton steelworks at Barramansa, Brazil, by Brassert Oxygen Technik, Zurich. At Gosipa, also in Brazil, an LD plant with an annual capacity of 600,000 tons is being built by VOEST, of Austria, in co-operation with a French firm. VOEST is also supplying an LD converter and other equipment to the 550,000-ton steel plant at Usiminas, being built by a Brazilian-Japanese consortium.

Miscellaneous Mines in Great Britain

REVISED list of miscellaneous mines (*i.e.* mines other than of coal, stratified ironstone, shale, or fireclay) in Great Britain, giving the names and addresses of owners, the names and addresses of mines, and the minerals worked, has been prepared by the Ministry of Power.

A copy of the list giving particulars of 131 mines may be obtained on application to the Ministry of Power, Safety and Health Division, Thames House South, Millbank, London, S.W.1. The price is 5s. including postage. The list will be revised annually.

Law Cases

MINER LOSES £8,000 CLAIM

CLAIM for £8,000 damages against the National Coal Board brought by Kirsten Chetty (32), a miner, failed in the Court of Session. Chetty was injured in a fall at Lingerwood Colliery, Midlothian, in 1955, and sustained a fractured thigh and a fractured leg.

He said that while building a pack at the coal face he had to reach out with a pick into the unsupported waste to obtain rubble and stones. There was a fall from the roof of the waste, and material rolled towards him and struck his legs. Chetty alleged that the Coal Board negligently failed to provide him with a rake so that he could stand in a safe place and reach out for waste material.

The board denied liability and maintained that the accident was caused through Chetty's own fault. At the end of the pursuer's evidence, Lord Wheatley decided that there was no case for the board to answer and in accordance with his direction the jury returned a verdict in favour of the National Coal Board.

FORMER SECRETARY of the Westthorpe Colliery (Derbyshire) branch of the National Union of Mineworkers, who last year was dismissed from his post for "neglect of duty," George Daykin (51) has been charged with embezzling from the branch the sum of £22 1s. 6d. which had been collected for the Six Bells Disaster Fund. Daykin elected to go for trial and the case was adjourned until March 22.

DAMAGES of £1,010 were awarded at Newport (Mon) Assizes to Mr. Albert Edward William Dent (46), a fitter, for an abdominal condition caused by an accident when working at the Pontymister (Mon), works of Partridge, Jones & John Paton, Limited, manufacturers of iron and steel castings, etc. Mr. Justice Finnemore said that Mr. Dent's condition had resulted from being gassed and exposed to cold and wet at the time of the injury.

FURTHER EVIDENCE was heard by the Port Talbot magistrates in a case involving the alleged theft of what the prosecution described as "enormous quantities of steel plate valued at £11,000." Charged jointly with conspiring to steal quantities of steel plate from the Steel Company of Wales, Limited, Glyndwr Davies (32), clerk, Cyril Cowell (36), site agent, Harold Wilkins (28), lorry driver, and Peter Edward Thomas (36), lorry driver, were sent for trial at Glamorgan Assizes.

Rising Order-book for Alfred Herbert

PERCENTAGE of orders which Alfred Herbert, Limited, machine-tool makers, of Coventry, is receiving from abroad is the highest for a very long period, states the chairman, Col. C. W. Clark. Productive capacity is fully employed and output is being increased as rapidly as possible, he adds. Throughout the year ended October 31, 1960, orders for the products of the company and its associates were at a high level.

Group net profit for the year was £1,738,352, against £1,366,393, after tax of £1,485,173 (£1,020,071). A final dividend of 6 per cent. makes a total of 8½ (7) per cent.

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Company News

£700,000 Clyde Crane Bid for Cowans Sheldon

TERMS of a merger proposal between Clyde Crane & Booth, Limited, steam and electric crane manufacturing group, of Gateshead, and Cowans, Sheldon & Company, Limited, engineers and crane specialists, of Carlisle, were announced last week under which Clyde Crane offers to acquire Cowans' £150,000 one-class capital. The offer terms are five Clyde 4s. ordinary shares, after a one-for-three scrip issue to existing holders, plus 2s. cash, for every £1 Cowans share. Based on the price of Clyde shares on Thursday of last week, the offer is 90s. a share, making the bid worth about £700,000.

Cowans directors are accepting the offer for their shares and are recommending the other shareholders to do likewise. The Clyde board, of which Mr. J. B. Woodeson is chairman, states it is intended to continue the business of Cowans as a separate entity. It is not intended to disturb the existing management and staff. Maj-Gen. Sir John Kennedy, chairman of Cowans, will join the board of Clyde as deputy chairman, and Mr. P. M. Rambaut, managing director of Cowans, and one other director, will also join the Clyde board.

RATCLIFFS (GREAT BRIDGE), LIMITED, metal rollers, of Tipton (Staffs)—Final dividend of 7½ per cent. for 1960 maintains the total dividend at 10 per cent. Group net profit was £244,616 (£294,976), after tax of £142,596 (£218,500).

FLUIDRIVE ENGINEERING COMPANY, LIMITED—Dividend for year ended September 30, 1960, is 13 (12) per cent. Group net profit increased to £114,540 (£94,897), after tax of £67,217 (£70,709), and including unrequired tax £4,363 (£1,318).

ALUMINIUM, LIMITED—Consolidated sales of aluminium in 1960 were 705,000 tons, against 643,000 tons in 1959. Preliminary net income was $39,000,000 ($24,000,000) and the earnings per share totalled $1.28, against 79 cents. per share in 1959.

WESTINGHOUSE BRAKE & SIGNAL COMPANY, LIMITED—In future an interim dividend is to be paid. It will be declared in July and paid in September. The current year's trading results are close to those expected, says the chairman, Capt. A. R. S. Nutting.

LONDON TIN CORPORATION, LIMITED—Dividend for the year ending March 31, 1961, is raised to 35 (25) per cent. with a second interim payment of 27½ per cent. in lieu of a final dividend. The directors expect the net profit for the year, after tax, to be about £980,000 (£598,943).

GAS PURIFICATION & CHEMICAL COMPANY, LIMITED—Due to the difficult trading conditions for a number of subsidiaries, the profit, before tax, for the six months to December 31, 1960, was about £60,000, against £505,000 in the corresponding 1959 period. No interim dividend is to be paid for the year ending June 30, 1961.

BROMILOW & EDWARDS, LIMITED, manufacturers of hydraulic tipping machinery, etc., of Bolton (Lancs)—Final dividend of 11 per cent. makes 18 (15) per cent. for the year ended November 30, 1960, on the existing £637,500 capital. It is proposed to convert the 10s. shares into 5s. shares and to make a scrip issue of one new 5s. share for every three held after the conversion. Net profits rose to £221,192 (£140,398), after tax of £204,929 (£127,483).

STEETLEY COMPANY, LIMITED, manufacturers of refractories, of Worksop (Notts)—Group net profits rose from £1,306,885 to £1,498,881 in 1960, of which £1,472,195 (£1,282,117) is attributable to the holding company. The dividend is raised by two per cent. to 16 per cent. with a final of 11 per cent. The 1960 figures include for the first time those of Canada Crushed & Cut Stone, Limited, in which Steetley holds 66 per cent. of the equity.

DOWTY GROUP, LIMITED, aircraft equipment manufacturers, of Cheltenham (Glos)—An interim dividend of 4 per cent., tax free, for the year to March 31, 1961, has been declared against the equivalent of 3.6 per cent. net. The directors state that there is no reason to expect a lower rate of final dividend than last year. A final dividend of 5½ per cent., tax free, was paid for 1959-60 on the capital increased by a two-for-three scrip issue, making the equivalent of 9.1 per cent. net for that year.

GEORGE COHEN 600 GROUP, LIMITED—Interim dividend of 4½ per cent. has been declared on the £3,125,000 old ordinary stock in respect of the financial year to March 31, 1961. The half-yearly dividend due on March 31, 1961, on the £1,500,000 4½ per cent. cumulative preference stock is to be paid at the rate of 4½ per cent. per annum, and the half yearly dividend due on the same date on the £1,000,000 6½ per cent. second cumulative preference stock is to be paid at the rate of 6½ per cent. per annum.

MASSEY-FERGUSON (HOLDINGS), LIMITED—Share capital of Ferguson, Limited, Dublin, has been acquired and that company will now be known as Massey-Ferguson (Eire), Limited. While overall control of the operations of the new company is in the hands of Massey-Ferguson (United Kingdom), Limited, local direction of the Irish company will remain with Mr. Brendan Williams as general manager and the following directors: Mr. E. W. Young, Mr. G. A. Hunt, Mr. S. E. Spicer, Mr. L. H. Pomeroy, Mr. H. W. Waite, and Mr. J. O'Hagan. Massey-Ferguson (Eire) will undertake the wholesale business of selling agricultural machinery.

HALL-THERMOTANK, LIMITED—In the year ended September 30, 1960—the first full year of group operations—group profit was £1,261,035 (£930,416), before tax of £778,220 (£549,516). Although the UK members of the group had a successful year certain oversea subsidiaries—notably Canada and the US—incurred losses. In order to neutralize the effect of the unexpected US losses, which existed at the time of his resignation as chairman, Mr. I. M. Stewart made a voluntary payment of £100,000, states the board. The final dividend is raised from 5½d. to 6d. per 5s. share making a total of 6¾d. for the year, compared with 6d. previously.

JOHN BROWN LAND BOILERS AND FOSTER WHEELER LINK

CONSORTIUM has been formed by John Brown Land Boilers, Limited, a subsidiary of John Brown & Company, Limited, and Foster Wheeler, Limited, to be known as Foster Wheeler John Brown Land Boilers Consortium, to carry on as a joint venture the business of tendering for and building power station boilers for UK and Eire public authorities.

Lord Aberconway, John Brown chairman, last year referred to the group's boiler subsidiary and other companies having reported a "dearth of inquiries, intense competition for orders at unremunerative prices, and worsening prospects of profit." Foster Wheeler is the UK manufacuring subsidiary of the Foster Wheeler Corporation, power plant manufacturers, of New York.

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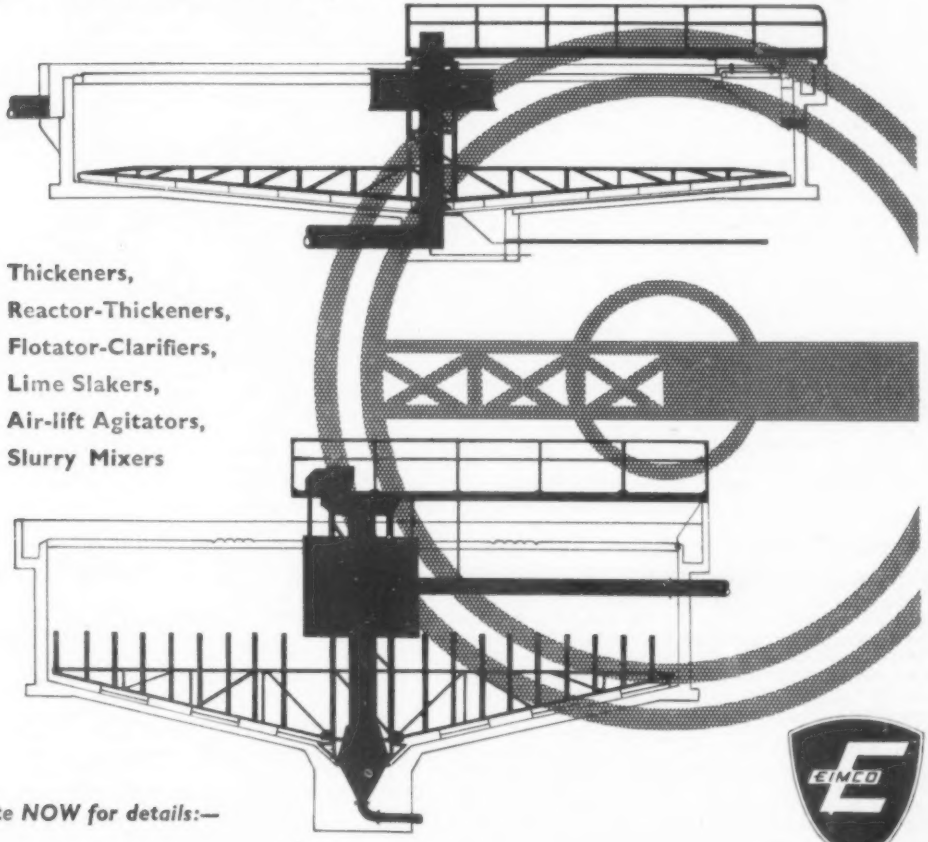

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No Nationalization for Eire's Coal

HE could see no justification for the nationalization of the Arigna coal industry, said Mr. Childers, Minister for Transport and Power, speaking in the Dail, in Dublin, during a debate on the country's coal industry. The Government had been urged to use the resources of the industry to the full under the auspices of Bord ña Mona (Turf Board), or some separate semi-State body.

Dr. Browne maintained that Arigna, the last remaining part of Eire's fuel and power economy outside State control, should be brought under the Minister. Not only would the industry be better run, but improved conditions and more secure employment could be ensured for those engaged in the industry. So long as Eire burned Polish, American, and British coal, it was obvious, said Dr. Browne, that the home mines were not being run competently. He could not agree with the Minister that turf was fighting a death battle with coal. Turf had won the fight, he believed, and turf briquettes were now being sold in Britain.

Replying, the Minister said that in spite of the severe competition from electricity and oil for power needs and the imports of US, Polish, and German coal, Arigna was now in a stronger position than ever before. The erection of a power station took two thirds of Arigna's annual production and this, with the amount purchased for the Ringsend (Dublin) power station, accounted for five sixths of output.

Under the terms of the Anglo-Irish agreement they could not impose a tariff on imported coal, nor could semi-State bodies be compelled to use Arigna coal. He welcomed the recent setting up by Arigna of the Western Collieries' Association which was to co-ordinate collieries' efforts to increase production.

The Government had made £150,000 available for the exploration of coalfields and borings were being made in County Leitrim. A scheme was also being drafted by his Department for the better processing and exploitation of Arigna coal. If sufficient reserves could be found in Leitrim, consideration would be given to the building of a second power station there.

Coroner's Advice to Miners' Relatives

AFTER returning verdicts of Death from an Industrial Disease on two former miners, one of whom had been refused a pension by the Industrial Diseases Board, Mr. D. F. Cave, the South West Staffordshire Coroner, advised the men's relatives to get legal advice about pension rights. The men, Mr. Norman Benjamin Pearson (64), and Mr. Benjamin Jones (51), had both been forced to give up work in the mines through ill health.

It was stated that Mr. Pearson was examined a month before his death by the Industrial Diseases Board and refused a pension. A member of the board agreed with the findings of Prof. J. M. Webster at the inquest that pneumoconiosis had been a factor in Mr. Pearson's death. A representative of the Silicosis Board agreed with Prof. Webster's finding that Mr. Jones had suffered from pneumoconiosis and that the disease had contributed to his death.

SCOUT TROOP in the Dominican Republic has discovered an apparently rich coal deposit in Puerto Plata province.

Coal Chartering

AT present the Hampton Roads coal market, irrespective of destination, is quiet with no particular interest in fixing early or forward tonnage on the part of charterers. Chartering to Japanese destinations has been on a considerably lesser scale, although a 20,000-tonner for March loading is reported fixed at $8.20, with a 10,000-tonner for the same position at 20 cents extra, and $8.30 has also been fixed for March loading. Chartering has been resumed to West Italy, two March vessels having been fixed at $3.95 and a further March loader accepted 10 cents less, and 14,000 tons for late February/March 10 has been taken for Yugoslavia at $4.95. There is really nothing to be worked from the Roads to the Continent beyond the possibility of an odd re-let cargo.

Gdynia or Gdansk to West Italy has taken 6,000 tons for February at 25s. 6d. one port, option two discharge at 1s. extra, and 3,500 tons also February to Sicily-Bari Range at 30s. 6d. As far as the UK is concerned, there is only a moderate enquiry from the East Coast with possibilities of working contract business to Portugal and tonnage is required for Alexandria for loading next month. There are also possibilities of small tonnage from the West Coast UK to the West Italian Range. There is, however, still quite a reasonable inquiry from the East Coast on Scandinavian account.

"Don't Go In Pit, Son" Attitude Condemned by NUM

"MANY miners are behind the times and still have the idea that all that is required in the pits is just a pick-axe and hard work. That is not the case." So says an article in the official organ of the Derbyshire Area of the National Union of Mineworkers which takes miners to task for discouraging young men from entering the industry. "Local employment officers are finding it extremely difficult to recruit young men for the NCB training scheme," the article reports, and goes on: "In their considerable reluctance to take the scheme, boys have often been strongly supported by their parents."

In the Ilkeston and Heanor areas of Derbyshire there are 50 vacancies in the NCB's apprentice training school. "We have one of the best training schemes in any industry," the article points out, "and we just cannot recruit enough suitable boys."

A local youth employment officer, commenting on the article, said that parents who dissuaded their sons from going into coal mining were one of the prime reasons for the shortage.

UK FIRMS URGED TO EMPLOY SPECIALIST EXPORTERS

SPECIALIST exporters should be employed by firms which have become accustomed to employing specialists in other fields, Mr. A. J. Townsend, secretary and director of the Institute of Export, told members of Sheffield and District branch of the institute last Friday. He said exporting was no job for amateurs.

Defending Britain's export drive, Mr. Townsend said: "As professional exporters we take the poorest view of being told that, in this day and age, we are falling down on our job. Particularly when it comes from newspapers whose contribution to the balance of payments is the importing of large quantities of newsprint."

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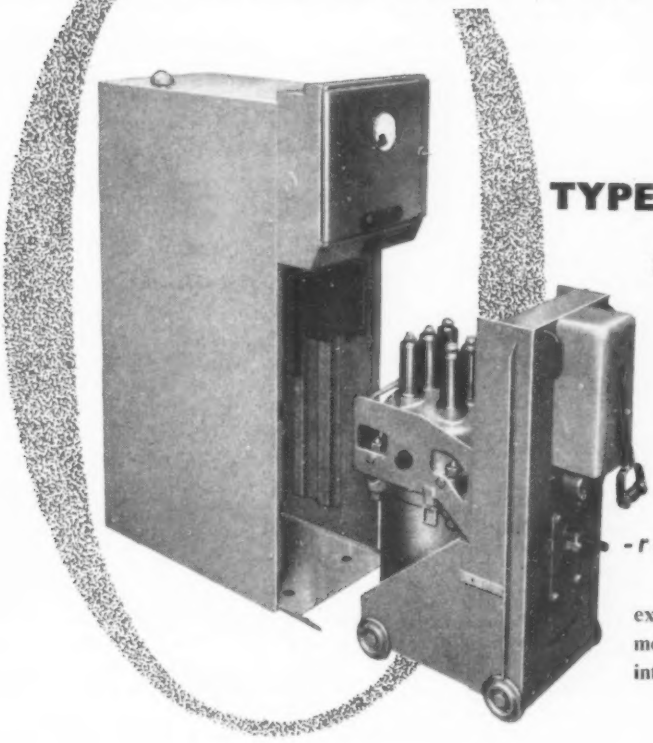

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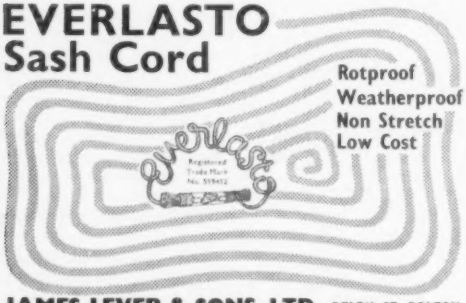

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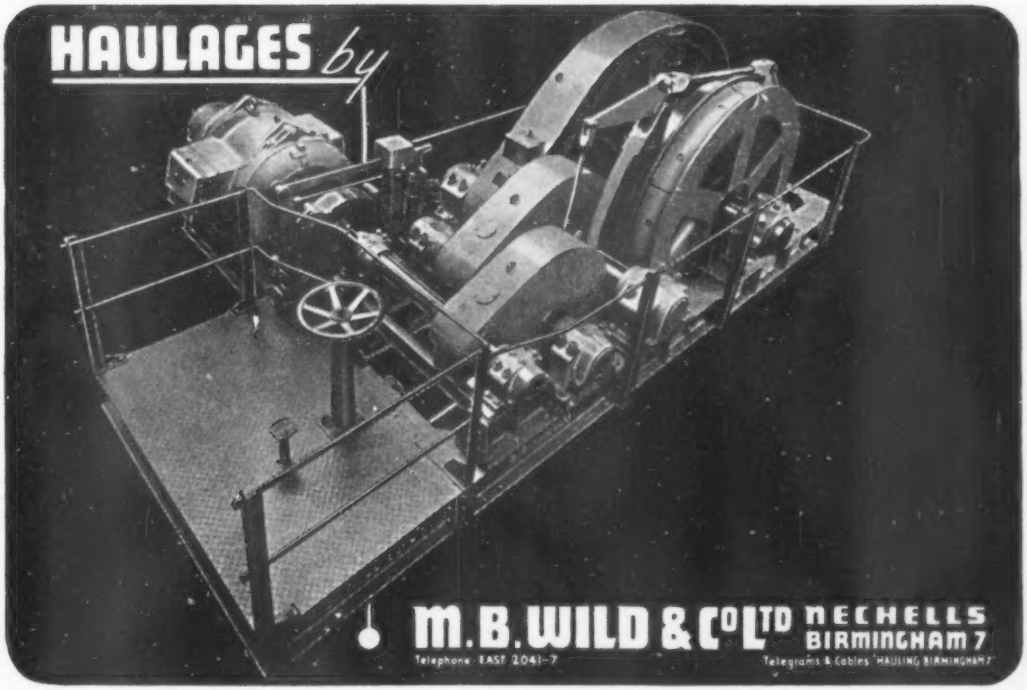

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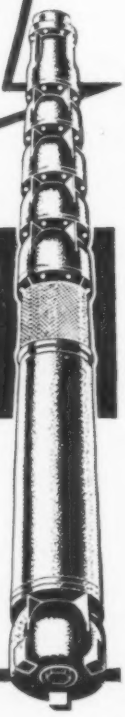

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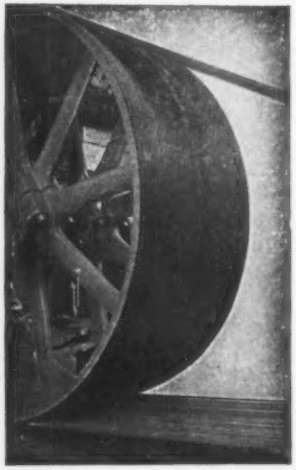

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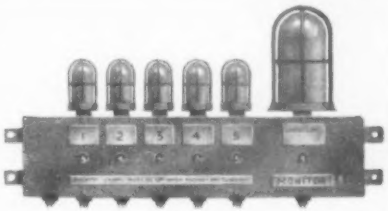
Fig. 1.

Fig. 2.

Fig 3.



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Kennedy, Allan & Co. Ltd. —
Kenyon, Wm. & Sons Ltd. —

Lafarge Aluminous Cement Co. Ltd. 59
Lanarkshire Bolt Ltd. —
Lancaster & Tonge Ltd. —
Lane, Francis & J. S. Ltd. —
Ledward & Beckett Ltd. —
Lever, J. & Sons Ltd. 68
Lilleshall Co. Ltd. —
Lindley, H. Ltd. 44 & 45
Locker Industries Ltd. 69
Lodge-Cottrell Ltd. —
Lumb, Jas. & Sons Ltd. —
Lysaght's, John Scunthorpe Works Ltd. 47

Mackley, E. N. & Co. Ltd. —
M. & C. Switchgear Ltd. —
Markham & Co. Ltd. —
Marshall, Thos. & Co. (Loxley) Ltd. 38
Martin Black & Co. (Wire Ropes) Ltd. 20
Massey, B. & S. Ltd. —
Mastabar Mining Equipment Co. Ltd. 15
Mather & Platt Ltd. —
Matthews & Yates Ltd. —
Mayor & Coulson Ltd. 3
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Mills, James Exors. of —
Millspaugh Ltd. —
Mine Safety Appliances Co. Ltd. —
Mining Engineering Co. Ltd. 35
Mitchell Ropeways Ltd. —
Mobil Oil Co. Ltd. —
Molem-Centraline 72
Moler Products Ltd. 6
Mond Nickel Co. Ltd. —
"Monitor" Patent Safety Devices Ltd. 75
Mono Pumps Ltd. —
Moorwood, John M. Ltd. —
Morgan Refractories Ltd. —
Morris, Robert Ltd. —
Murex Welding Processes Ltd. —
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New Conveyor Co. Ltd. —
Newell, Ernest & Co. Ltd. 13
Newton Chambers & Co. Ltd. —
Niagara Screens & Plant Ltd. —
Nife Batteries —
Nordberg Manufacturing Co. Ltd. —
North Eastern Marine Engineering Co. Ltd. —
Northfield Industrial Fabrications Ltd. 16 & 17
Norton Harty Engineering Co. Ltd. —
Norton, Sir James Farmer & Co. Ltd. 42
Nortons Tividale Ltd. —

Oldham & Son Ltd. —
Ormerod, Edward & Co. Ltd. —
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Pickford, Holland & Co. Ltd. —
Pittrail Ltd. —
Power-Gas Corporation Ltd. —
Power Gas Economy Co. 67
Power Plant Co. Ltd. 61
Premier Cooler & Engineering Co. Ltd. —
Press, Wm. & Son Ltd. —
Price, J. T. & Co. Ltd. —
Priest Furnaces Ltd. 46
Procter Bros. (Wireworks) Ltd. —
Protector Lamp & Lighting Co. Ltd. —
Pulsometer Eng. Co. Ltd. 67

Qualter Hall & Co. Ltd. —

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Rhymney Engineering Co. Ltd. —
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Richardsons Westgarth Atomic Ltd. —
Richardsons Westgarth (Hartlepool) Ltd. —
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Robey & Co., Ltd. —
Rocol Ltd. —
Ropeways Ltd. —
Ross Engineers Ltd. —
Round Oak Steel Works Ltd. 43
Ruston & Hornsby Ltd. 56
Ruston-Bucyrus Ltd. —

Sack, Maschinenfabrik, G.m.b.H. —
Safety in Mines Developments Ltd. —
Salem-Brosius (England) Ltd. 2
Saunders Valve Co. Ltd. 41
Sentinel (Shrewsbury) Ltd. 11
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Smallman, Jas. W. Ltd. 68
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Wigglesworth, F. & Co. Ltd. 74
Wild, A. G., & Co. Ltd. 26 & 27
Wild, M. B. & Co. Ltd. 71
Willcox, W. H. & Co. Ltd. 77
Wincott, G. P. Ltd. —
Wombwell Foundry & Engineering Co. Ltd. —
Wood, Hugh & Co. Ltd. 51
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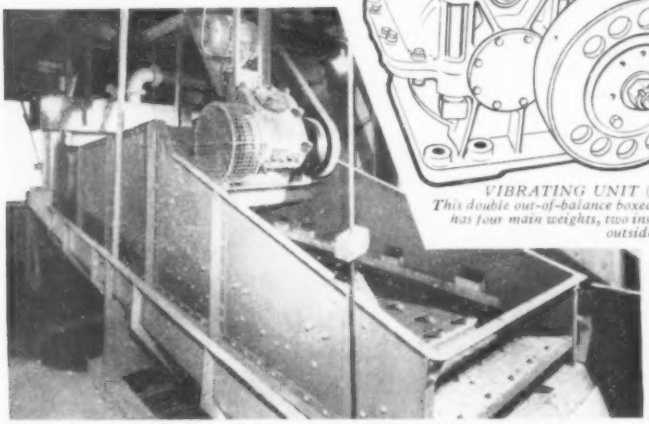

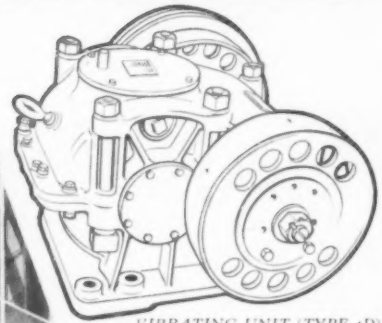

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Appleby-Frodingham Steel Co. .. —
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Armytage & Sons Ltd. .. 67
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Associated Electrical Industries Ltd. (Heavy Plant Division) .. —
Associated Electrical Industries Ltd. (Instrumentation Division) .. —
Associated Electrical Industries Ltd. (Motor & Control Gear Division) .. —
Associated Electrical Industries Ltd. (Switchgear Division) .. 65
Associated Electrical Industries Ltd. (Traction Division) —
Associated Electrical Industries Ltd. (Transformer Division) .. —
Associated Electrical Industries Ltd. (Turbine Generator Division) .. —
Atlas Copco (G.B.) Ltd. .. —
Aurora Gearing Co. (Wilmot North) Ltd. .. —
Austin, Jas. & Sons (Dewsbury) Ltd. .. —
Auto-Klean Strainers Ltd. .. —
Automatic Coal Cleaning Co. Ltd. .. 77
Aveling-Barford Ltd. 29

Bagnall, W. G. Ltd. .. —
Bairds & Scottish Steel Ltd. .. —
Barker, Davies & Co. .. 74
Barlow & Chidlaw Ltd. .. —
Barnes & Bell Ltd. 75
Barrow Ironworks Ltd. .. —
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Becorit (G.B.) Ltd. .. .. —
Beldam Asbestos Co. Ltd. .. —
Belliss & Morcom Ltd. .. —
Belmos Co. Ltd. 12
Beresford, Jas. & Son Ltd. .. 72
Birkett, Billington & Newton Ltd. .. —
Birlec-Efco (Melting) Ltd. .. —
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Blandford-Gee Cementation Co. Ltd. .. —
Blantyre Engineering Co. Ltd. —
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Brightside Foundry & Engineering Co. Ltd. .. .. —
British Belting & Asbestos Co. Ltd. .. .. —
British Electrical Repairs Ltd. —
British Iron and Steel Federation .. .. —
British Jeffrey-Diamond Ltd. 18
British Nylon Spinners Ltd. .. —
British Oxygen Co. Ltd. .. —
British Paints Ltd. .. .. —
British Resistor Co. Ltd. .. —
British Rollmakers Corporation Ltd. .. .. —
British Ropeway Engineering Co. Ltd. .. .. —
British Steam Specialties Ltd. 74
British Timken: Division of the Timken Roller Bearing Co. .. .. —
Broadbent, Thos. & Sons Ltd. —
Brown, David Corporation (Sales) Ltd. .. .. —
Brush Electrical Engineering Co. Ltd. 24
B.T.R. Industries Ltd. .. 7
Burnand, W. E. & Son Ltd. .. —
Burnside, George Ltd. .. —
Burtonwood Engg Co. Ltd. .. —
Bushing Co. Ltd. .. .. —

Cable Belt Ltd. 32
Calomax (Engineers) Ltd. .. —
Carblox Ltd. .. .. .. —
Cascade Water Coolers Ltd. .. —
Cast Basalt Products Ltd. .. —
Ceag Ltd. 79
Chloride Batteries Ltd. .. —
Churchill Machine Tool Co. Ltd. —
Clarke, Chapman & Co. Ltd. .. —
Clark, Geo. & North Eastern Marine (Sunderland) Ltd. .. —
Clayton Equipment Co. Ltd. .. —
Cleveland Bridge & Engineering Co. Ltd. .. .. —
Cohen Bros. (Electrical) Ltd. —
Cohen Geo. Sons & Co. Ltd. .. 80
Colvilles Ltd. .. .. .. —
Conflow Ltd. .. .. .. —
Consett Iron Co. Ltd. .. .. —
Consolidated Pneumatic Tool Co. Ltd. .. .. .. —
Cooke, Troughton & Simms Ltd. —
Cooper, Jas. Milne & Co. Ltd. —
Cooper Roller Bearings Co. Ltd. —
Coppee Co. (Gt. Britain) Ltd. —
Cotterill, Herbert Ltd. .. —
Coulson, M. & Co. Ltd. .. —
Courtaulds Ltd. 48
Cowlishaw, Walker & Co. Ltd. —
Cox & Danks Ltd. .. .. —
Crawley Industrial Products Ltd. .. .. .. 30 & 31
Cripps, R. & Co. Ltd. .. —
Crofts (Engineers) Ltd. .. —
Crompton Parkinson Ltd. .. —
Crushing, Screening & Engineering Ltd. .. .. —
Curtis, A. L. (Onx) Ltd. .. —

Davenport Engineering Co. Ltd. .. .. —
Davey, Paxman & Co. Ltd. .. 56
Davis, John & Son (Derby) Ltd. .. .. —
Davy & United Engineering Co. Ltd. 36
Dawson & Downie Ltd. .. —
Demag A.G. .. .. .. —
Demolition & Construction Co. Ltd. .. .. .. —
Denison, Samuel & Sons Ltd. —
Distington Engineering Co. Ltd. .. .. .. —
D.M.M. (Machinery) Ltd. .. —
Dobson, W. E. & F. Ltd. .. —
Dollery & Palmer Ltd. .. —
Donkin & Bryan Co. Ltd. .. —
Dorman Long & Co. Ltd. .. —
Dougall, James & Sons Ltd. .. —
Dowty Mining Equipment Ltd. 52
Dunlop Rubber Co. Ltd. .. —

Eagre Construction Co. Ltd. .. —
Eickhoff, Gebr. .. .. —
Elmco (Gt. Britain) Ltd. .. 63
Elastic Rail Spike Co. Ltd. .. —
Elcordia Ltd. .. .. .. —
Electrical Development Association .. .. —
Electric Furnace Co. Ltd. .. —
Ellis, A. & Sons (Wakefield) Ltd. .. .. .. —
Engineering, Marine, Welding & Nuclear Energy Exhibition 70
English Electric Co. Ltd. .. —
English Steel Corporation Ltd. 40
Evans, Joseph & Sons (Wolverhampton) Ltd. .. .. —
Ewart Chainbelt Co. Ltd. .. —

Fearnehough, W. Ltd. .. —
Felco Hoists Ltd. .. .. —
Fenner, J. H. & Co. Ltd. .. 9
Finlay Engineering Co. Ltd. .. —
Firth, Thos. & John Brown Ltd. —
Firth-Vickers Stainless Steels Ltd. .. .. —
Fisher & Ludlow Ltd. .. —
Follsain-Wycliffe Foundries Ltd. .. .. .. —
Foraky Boring & Shaft Sinking Co. Ltd. .. .. —
Foster, T. S. & Sons Ltd. .. —
Foster, Henry & Co. Ltd. .. —
Foundry Services Ltd. .. —
Fowler, John & Co. (Leeds) Ltd. 8
Fuel & Metallurgical Processes Ltd. .. .. .. —
Fullerton, Hodgart & Barclay Ltd. .. .. —

Gas Council .. .. .. —
General Electric Co. Ltd. .. 22
General Refractories Ltd. .. —
Gent & Co. Ltd. .. .. —
Gibbons Bros. Ltd. .. .. —
Gibbons (Dudley) Ltd. .. —
Glover Bros. (Mossley) Ltd. .. —
Glover, Wm. Jas. & Co. Ltd. .. —
Goodall, Clayton & Co. Ltd. .. —
Goodyear Tyre & Rubber Co. Ltd. .. .. —
Green, E. & Son Ltd. .. —
Green, Horace & Co. Ltd. .. —
Greening, N. & Sons Ltd. .. —
Guest, Keen Iron & Steel Works .. .. —
Gullick Ltd. 57
Gutehoffnungshutte Sterkrade —

Hackbridge & Hewittic Electric Co. Ltd. .. .. —
Hadfields Ltd. .. .. —
Halesowen Steel Co. Ltd. .. 74
Hall Bros. (West Bromwich) Ltd. .. .. .. —
Hallamshire Steel Co. Ltd. .. —
Hanmade Conveyor Co. Ltd. .. 49
Hardman, E. Son & Co. Ltd. .. —
Harland Engineering Co. Ltd. —
Harlow, Robt. & Son Ltd. .. —
Harvey, G. A. & Co. (Ldn.) Ltd. —
Hatchett & Co. Ltd. .. .. —
Hayden-Nilos Ltd. 34
Head, Wrightson & Co. Ltd. .. —
Head, Wrightson Minerals Engineering Ltd. .. .. —
Head, Wrightson Machine Co. Ltd. .. .. —
Head, Wrightson Teesdale Ltd. .. .. —
Heap, Joshua & Co. Ltd. .. —
Heeley (Mining Machinery) Co. Ltd. .. .. .. —
Hick, Hargreaves & Co. Ltd. 53
Hill, Richard Ltd. .. .. —
Hills (West Bromwich) Ltd. .. —
Hollybank Engineering Co., Ltd. .. .. —
Holman Bros. Ltd. .. .. —
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Honeywell Controls Ltd. .. —
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Hudswell, Clarke & Co. Ltd. .. —
Humber Graving Dock and Engineering Co. Ltd. .. —
Hunslet Engine Co. Ltd. .. —
Huntington, Heberlein & Co. Ltd. 23

Imperial Chemical Industries Ltd. 14
Incandescent Heat Co. Ltd. .. —
International Combustion Products Ltd. .. .. —
International Construction Co. Ltd. 50
International Harvester Co. of Great Britain Ltd. .. —
Intrafor Mining Engineers Ltd. 68

Jackson Isaac & Sons (Fasteners) Ltd. .. .. —
Jenkins, W. J. & Co. Ltd. .. —
Johnson Rolls Ltd. .. .. —
Jones, W. Stanley (Engineers) Ltd. .. .. .. —
Joy, Sullivan Ltd. .. .. —

(Continued on page 76)

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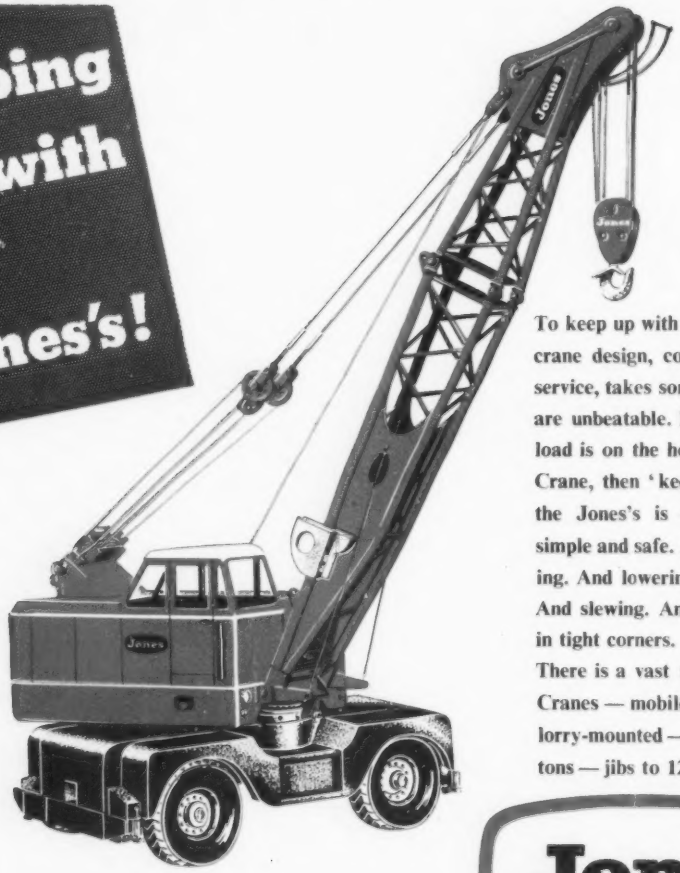

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